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CONFERENCE ISSUE

Vol. XXXI No. 3 MAY—JUNE 1977

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on

Dehydrated Foods Industry

in India

Will be held in New Delhi

on

10th and 11th December, 1977

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OR

2. INDIAN DEHYDRATED FOODS INDUSTRIES ASSOCATION

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on

Dehydrated Foods Industry

in India

Will be held in New Delhi

on

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Vol. XXXI No. 3

CONTENTS

1. Editorial 3
2. All India Food Preservers' Association—34th Annual General Meeting . . 5
3. Address of the President . . . 9
4. Inaugural Speech 13
5. Keynote Address 16
6. Technical Advisory Committee Meeting 29
7. Utilization of Unconventional Fruits for the Preparation of Ready-to-Drink Beverages—Part I. . . . 38
8. Utilization of Unconventional Fruits for the Preparation of Ready-to-Drink Punches—Part II. . . . 47
9. Comparison of Different Methods of Estimation of Sulphur Dioxide in Fruit Beverages 53
10. Physico-Chemical Properties of some Citrus Essential Oils . . . 57
11. Studies on Defatting of Peanuts and Soyabeans for Developing Ready-to-Eat Snack Items 61
12. Book Reviews 77
13. Notes and News 83
14. Export News 91
15. Foreign News 96
16. Government Notifications . . 109
17. Men and Companies 110

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INDIA

Editorial

The news about the partial dismemberment of the Council of Scientific and Industrial Research (CSIR) has come as a shock to many indigenously owned industries. After a long gestation period, the National Laboratories have reached a level of maturity and awareness where they could understand the problems of the industry, identify the technological constraints and find solutions according to its needs. This has become possible after a long struggle. Red tape has been cut in most cases so that the industry and the research worker at the bench and pilot plant level could interact directly. The struggle has taken over a quarter of a century.

The sudden decision, without consulting the scientific community and the indigenous industrialists, to dismember CSIR and make most of the National Laboratories part of the machinery of the concerned ministries is a major *step back* in India's self reliance. The present time required greater decentralization and it was expected that the leaders would live up to their commitments. What has happened instead is precisely the reverse.

The large corporations, many of them foreign controlled, can look to their benefactors abroad for technical assistance, but not the small and medium scale Indian entrepreneur specially in food and agricultural industries. For them, institutions like Central Food Technological Research Institute (CFTRI), Mysore and other regional laboratories have been the guiding force for development. The development of '77'—the new national beverage—is another feather in the Cap of CFTRI whose formula for Baby Food and Balamul and protein rich foods have earned nation wide recognition.

National Laboratories belonging to an autonomous body like the CSIR could work for several ministries as they were not under the control of any one of them; they could speak for the industry when necessary. The new pattern would obviously shackle them and even muzzle their voices. The country has suffered much from the brain drain. Interference with the freedom and creativity of scientists would accelerate the loss of manpower when it is much needed.

If any change is to be brought about in the infrastructure for scientific and technological research in the country with a view to making it more dynamic and effective, the matter would need a more careful examination. This examination can best be carried out as a joint study by the scientists and the concerned industry along with the participation of the technical personnel from the ministries. Its objectives should be to identify constraints which slow down the development efforts and then to find ways and means for overcoming them jointly. Such a study will create a new sense of awareness and responsibility as everyone concerned would have been taken into full confidence.

It is the indigenous industry, especially in the small and medium sector, which needs national laboratories as they have no benefactors abroad and are the largest employers of manpower.

The food industry appeals to the Government not to put the clock back and shackle science with administrative controls but to honour their election pledges of freedom and democracy through strengthening the scientific and technological base for modern *indigenous* industry.

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ALL INDIA FOOD PRESERVERS' ASSOCIATION—34th ANNUAL GENERAL MEETING

The 34th Annual General Meeting of the All India Food Preservers' Association was held at Hotel Imperial, Janpath, New Delhi, on Wednesday 25th and Thursday 26th May 1977.

Programme

Inaugural Session

Banquet Hall, Wednesday, 25th May 1977.

0930-1000: Registration of the delegates

1000-1100: Inaugural Session:

Welcome to the delegates and introduction of the Chief Guest, Shri R. Balasubramanian, Secretary, Department of Food, Ministry of Agriculture, New Delhi.

President's Address.

Inaugural Address by Shri R. Balasubramanian.

Keynote Address by Dr D. N. Saxena, Director-General, Indian Institute of Foreign Trade, New Delhi.

Citation and presentation of Kashalkar Memorial Award for the year 1976.

Citation and presentation of K.U. Patel Memorial Award.

Citation and presentation of Padmashri N. N. Mohan Memorial Award.

Citation and presentation of Yezdi Award.

Vote of thanks.

1100-1130: Coffee

1130-1330 Technical Advisory Committee Meeting:

1. Follow-up action on the points from the last Technical Advisory Committee Meeting.
2. Identification of general technical problems of the Industry.

(*a*) Implementation of P.F.A. Act and Rules with special reference to parameters of food products under P.F.A. Rules and analytical methods thereof;

(*b*) Supply of processed food products to Defence forces;

(*c*) Export of processed food products.

3. General discussions.

1330-1430: Lunch (AIFPA)

1430-1700: Technical Advisory Committee Meeting continued.

1700-1730: Tea

1930-2130: At-Home—Courtesy Zenith Tin Works (Private) Limited, Bombay.

Business Session

Raja Room, Thursday, 26 May 1977.

1000-1130: Business Session:

Approval of the Minutes of the 33rd Annual General Meeting.

Hony. Secretary's Report for the year 1976.

Passing of audited Statement of Accounts for the year ended 31st Dec. 1976.

Approval of Budget Estimates for the year 1977.

Appointment of auditors for the year 1977.

Election of office bearers and members of the Executive Committee for 1977.

Resolutions.

Any other matter with the permission of the Chair.

Vote of thanks.

1130-1200: Coffee

1200-1300: New Executive Committee Meeting:

1. Appointment of Convener, Technical Advisory Committee, for the year 1977.
2. Appointment of Editor, Indian Food Packer, for the year 1977.

Co-option of members and nomination of Permanent Invitees to the Executive Committee.

Operation of Bank Accounts.

Venue and date of the next Executive Committee Meeting.

General review of policy for 1977.

Any other matter with the permission of the Chair.

1300-1430: Lunch

1430-1630: Technical Advisory Committee Meeting.

Over one hundred and fifty delegates from different parts of the country including the members, invited participants and guests attended the Conference. A notable aspect of the Conference was that it had a wide spectrum of representation from various sectors of the Industry, like fruit and vegetable processing, dairy, meat, fish, alcoholic and non-alcoholic beverages, convenience foods, catering and bakery. The representation was significant inasmuch as the personnel were drawn from different disciplines of the industry, viz., Planning, Research and Product Development, Quality Control, Marketing, Public Relations, Advertising, Export Promotion and Industrial Communications, in addition to those of the fruit and vegetable growers, commission agents, technical consultants, export houses, merchant exporters, wholesale and retail trade in groceries, processed and packaged foods, institutional buyers, journalists, consultants in food processing, engineering, marketing and management, United Nations International Children Educational Fund (UNICEF), Indian Institute of Marketing and Management (IIMM), Central Committee for Food Standards (CCFS), Regional Research Laboratory (RRL), Jammu, and Small Industry Service Institute (SISI).

In response to the Association's invitation, the auxiliary industries such as food engineering, tin, glass, flexible containers, closures, printing, packaging, manufacturers of additives, enrichments and essential raw materials extended their valuable cooperation by deputing their executives from management, marketing, industrial communications, research and development departments, whose participation in the Conference added a new dimension.

The delegation from the Indian Institute of Foreign Trade attended the Conference under the leadership of their Director-General, Dr D. N. Saxena, and included Deputy Director General, Shri V. Vithal Babu and officers and consultants from different disciplines. S/Shri S. K. Kalia, S. L. Aggarwal and M. Dattatreyulu, who had conducted the study on Fruit and Vegetable Processing Industry in India, were also present.

It was indeed refreshing that the Central and State governments had also sent their distinguished representatives to the Conference. The Director (F and VP) and Regional Deputy Director (F and VP) represented the Food and Nutrition Board, Government of India. Joint Secretary, Dy Secretary, Financial Controller and other executives of the Ministry of Agriculture; those from the Ministries of Commerce, Health, Industries and Civil Supplies; Army Purchase Organisation; the State Trading Corporation of India; the Council of Scientific and Industrial Research; Indian Council of Agricultural Research; Indian Agricultural Research Institute; Indian Standards Institution; Food Corporation of India; the Processed Foods Export Promotion Council; State Depart-

ments of Delhi, Haryana, Punjab and Himachal Pradesh; Agricultural Universities; Banking and Financial Institutions; Association of Food Scientists and Technologists participated and contributed a great deal to the deliberations of the Conference. Advertising and Sales Promotion Organisations, Market Research Agencies, Distribution Houses and Wholesale Trade in Vegetable products also took part in the deliberations.

A delegation of scientists and technologists from the Central Food Technological Research Institute, Mysore, specialised in Fruit and Vegetable Technology; Industrial Research, Consultancy, and Extension Services; Experiment Stations and Training Centre under the leadership of Lt. Col. O. P. Kapur made notable contributions at the technical sessions.

The President, Shri D. D. Desai (M.P.), called the meeting to order at 10.00 a.m. He extended a warm welcome to the Chief Guest, Shri R. Balasubramanian, Food Secretary, Ministry of Agriculture and Irrigation, Government of India and Prof. D. N. Saxena, Director-General, Indian Institute of Foreign Trade, the members, participants and guests. The Hony Secretary, Shri Y. K. Kapoor, paid floral tributes to Shri R. Balasubramanian and Prof. D. N. Saxena.

Shri D. D. Desai then delivered the presidential address (Full text published in pages 9-12).

Inaugurating the Conference, Shri R. Balasubramanian recalled his long association with the Food Processing Industry in the country as Chairman, Processed Foods Export Promotion Council and Central Food Products Advisory Committee. The report on National Development of Food Industry 1971 was published under his Chairmanship. He emphasized that the climate in the country was well suited to grow a large assortment and varieties of temperate and tropical fruits, vegetables and flowers. Out of a total harvest of 32 million tonnes, approximately 20 per cent go waste during pre- and post-harvest operations. It is rather unfortunate that the Fruit and Vegetable Preservation Industry utilizes less than one per cent of the total production which is very small although not insignificant. The potentiality of this Industry is great with vast scope for its expansion. He went on to say that it has been brought to his knowledge by the Department that the existing capacity of the Industry is not fully utilized. The industry has been making requests, year after year, towards relief from Central Excise duty and allotment of levy sugar. No tangible action could be taken in the matter as the Government expects the fruit and vegetable preservation industry as also all other industries and trade to subscribe to the revenues which are so vitally needed for all development programmes. The industry should concentrate on and pay special attention to other profitable areas for its progress and manifold development. Over 50 per cent of the total production of canned, preserved and dehydrated fruit and vegetable products are either exported or bought by the Chief Directorate of Purchase (CDP), Army Purchase Organisation, for defence requirements. India is a large country and indeed there exists a vast potential for the development of the home market. Towards this end the members of the Industry should launch a perspectively planned and well delineated as well as viable market development and growth oriented mass media campaigns.

Another strong reason for the low demand and turnover is high price. He was happy that the Indian Institute of Foreign Trade was engaged for a detailed study and survey. The observations and recommendations of the study should be analysed in detail by all concerned and remedial steps taken. It is necessary to maintain a constant watch on the price of

the products to the end-consumer. We find the same conventional products in the market; evidently diversification and introduction of vitamin-rich, nutritive, ready-to-serve, convenience foods in the market should be considered by the industry through organised marketing and new concepts of resources and development. Suitable varieties of fruits and vegetables for processing should be developed. He cited the example of sugar industry in the country which organises regularly pre- and post-harvest research and development in the use of fertilizers, soil development and use of chemicals to develop the quality of sugarcane and improve upon yields per hectare resulting in improved productivity and profitability of the industry. The traditional practice of buying fruits and vegetables in 'Mandies' should be replaced by contract growing. The operation of intermediaries between the grower and the industry is not a healthy practice and should be done away with. Direct contract between the grower and the industry is a desirable arrangement. The industry should be in a position to provide technical advice to the growers to improve the varieties and productivity.

Shri R. Balasubramanian commented on the exhorbitant cost of packing and packaging. The difference between the cost of fresh and processed fruits and vegetables is very high. Attempts should be made to evolve cheaper, returnable and reusable glass and plastic containers. The bulk packaging is a common practice in the developed countries which considerably reduces the cost of packaging, transportation and distribution. He called upon the industry to work out a detailed proposal and if necessary, seek help and assistance from the Government.

Another factor which could go a long way in improving the economy of the industry and bringing down the consumer price is the utilization of factory wastes and recovery of by-products. He made a plea that the Central Food Technological Research Institute, Mysore, should help the industry towards efficient utilization of by-products and factory wastes. The Government of India has sought the assistance from Bulgaria in establishing modern agro-industries in Karnataka and Bihar for growing, utilization and processing of pineapples and tomatoes. Every effort should be made to increase the exports and earn maximum foreign exchange which is so vitally required for planned development of the country.

The Government of India has provided long-term financial and promotional assistance for the development of exports efforts. The inplant continuous export inspection scheme and the analysis of statistically and representatively drawn samples have helped to raise the quality image of Indian products in the overseas markets. More and adequate staff would be required to improve the quality control enforcement of products offered for exports. A subcommittee of the Central Fruit Products Advisory Committee is going through the existing FPO standards and suggest improvements to bring them in line with international standards as recommended by WHO/FAO/Codex Alimentarius. The new draft standards will be ready for circulation for inviting comments and suggestions which will be considered before they are adopted.

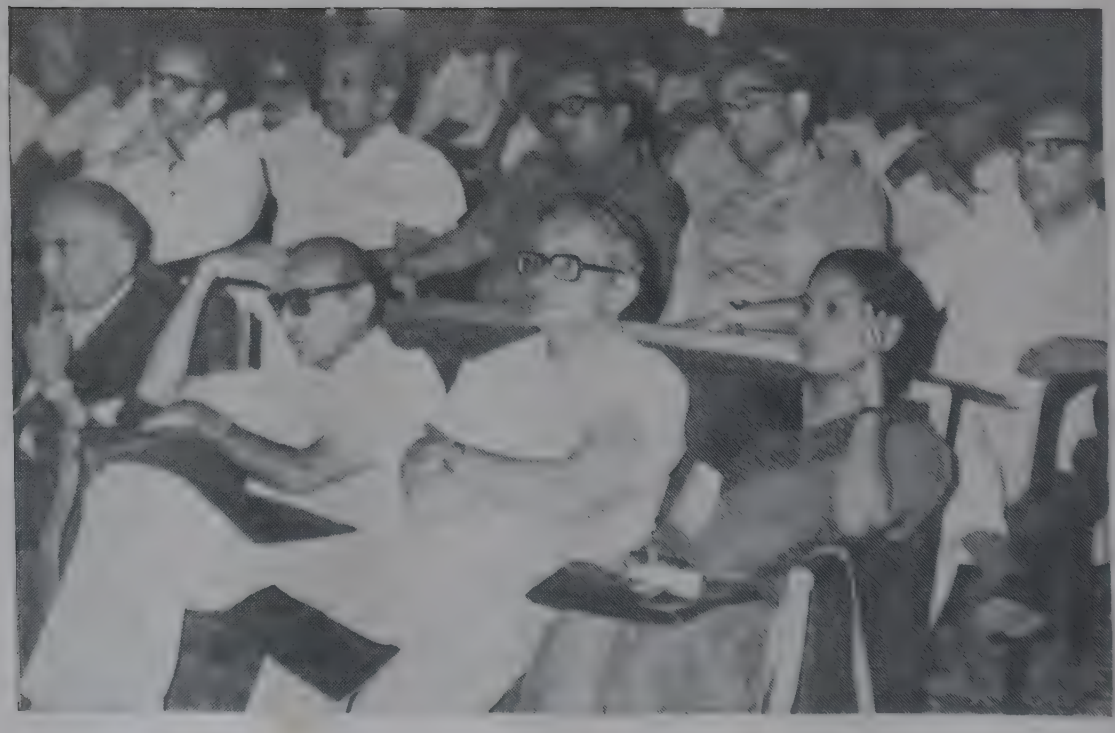
He inaugurated the 34th Annual General Meeting of the Association and looked forward to healthy and fruitful deliberations. He thanked the organisers for having given him the opportunity to put forward his views (Full text of Shri R. Balasubramanian's inaugural address is published in pages 13-15).

The keynote address was delivered by Prof. D. N. Saxena, Director-General, Indian Institute of Foreign Trade (pages 16-20).

The Chief Guest, Shri R. Balasubramanian, Food Secretary, Ministry of Agriculture and Irrigation received on arrival

Shri R. Balasubramanian, Dr. A. G. Naik-Kurade and Prof. D. N. Saxena, Director-General, Indian Institute of Foreign Trade

S/Shri R. Balasubramanian, R. K. Shastri, T. R. Parmeswaran, Daya Nand and P. R. Das



Audience

Audience

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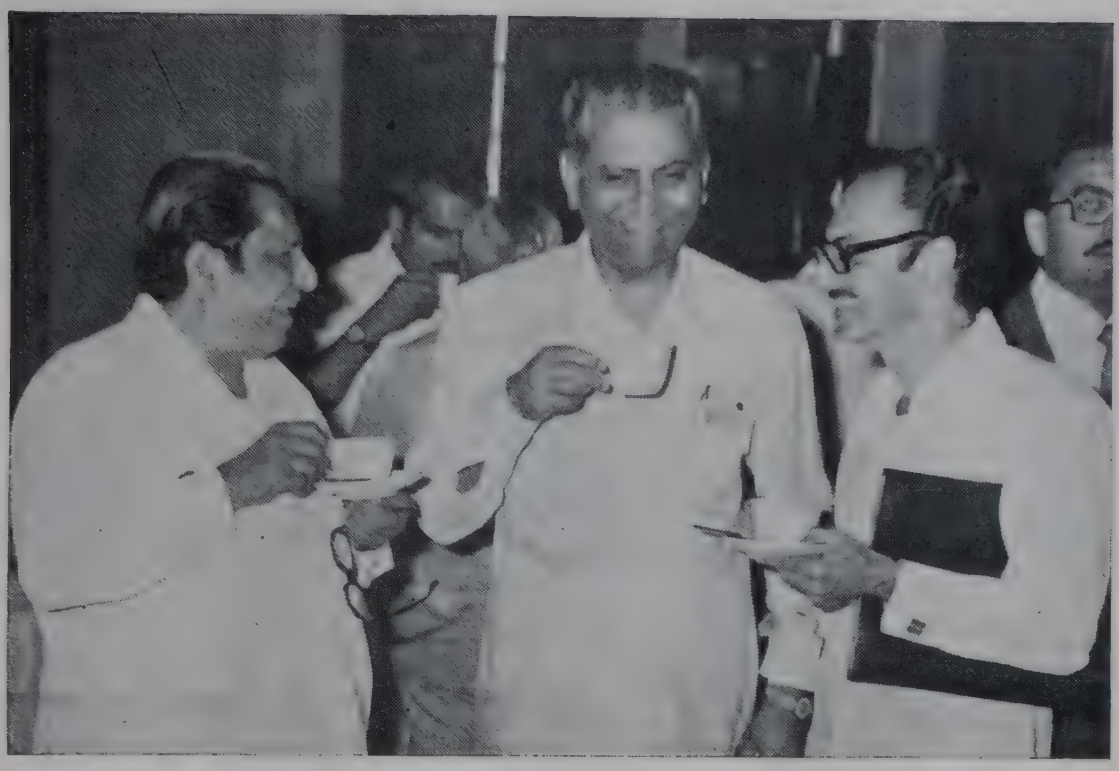
Dr. M. Mahadeviah receiving K. U. Patel Memorial Award



Tea—S/Shri S. S. Barodawala, D. D. Desai (M. P.) and P. D. Katrak

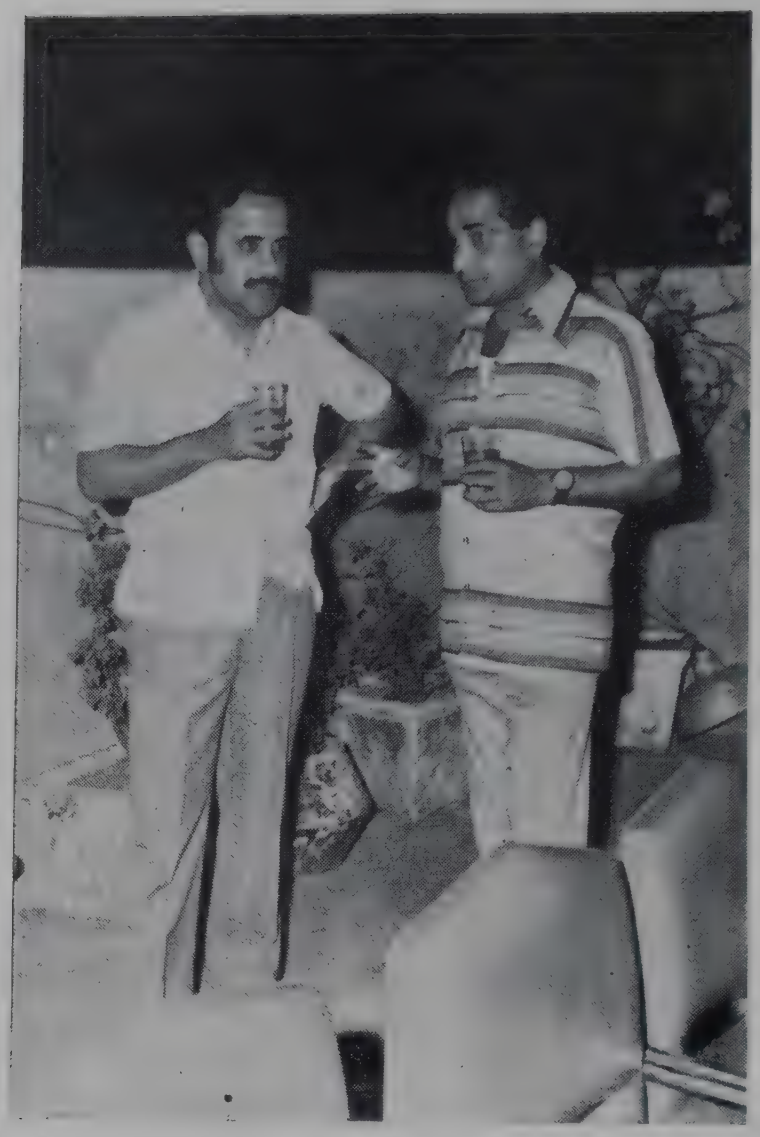
Dr. A. G. Naik-Kurade, Shri B. S. Sood and Shri V. L. Sharda

Col. R. N. Taneja, Lt Col. O. P. Kapur, Lt Col. D. D. Vohra and Capt. S. V. S. Choudhary

Shri P. S. Srinivasan, Smt Gowri Sundaram and Shri A. K. Tejani

Technical Advisory Committee Meeting—Shri D. S. Chaddha

Lunch: Capt S. V. S. Choudhary, Dr. J. Contractor, Shri Laljit Singh and Shri Kailash Nath



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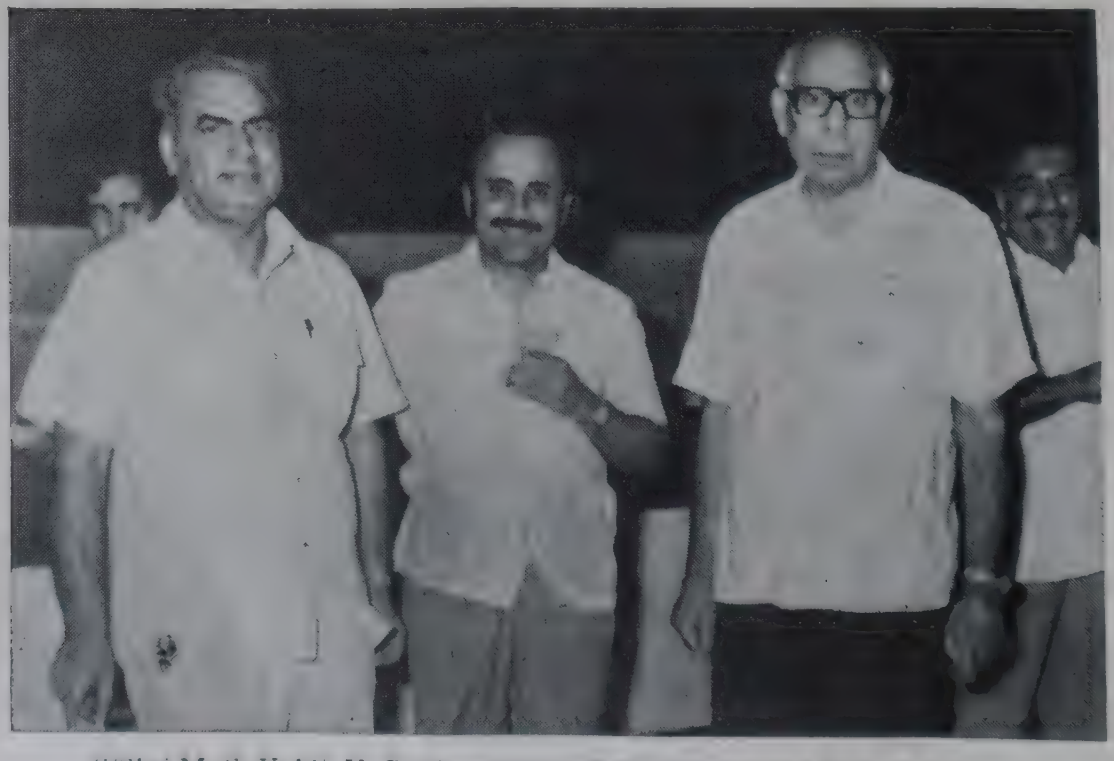

S/Shri M. S. Kohli, K. R. Narasimhan, P. N. Narang and B. S. Bahrry

ADDRESS OF THE PRESIDENT

Shri D. D. Desai, M.P.

Friends,

On behalf of the All India Food Preservers' Association, I have great pleasure in welcoming you all to this 34th Annual General Meeting. We are happy to have amidst us today Shri R. Balasubramanian, Secretary, Department of Food, Ministry of Agriculture and Irrigation, who has very kindly agreed to be the Chief Guest and inaugurate our Conference. We are grateful to Dr D. N. Saxena, Director-General of Indian Institute of Foreign Trade, who has agreed to deliver the Keynote Address which we all eagerly look forward to.

Since we last met in June 1976, in Mysore, the wheel of history has turned full circle in this country. For the first time, we are close to a two-party system, so essential for a healthy democracy. On behalf of you all, I sincerely welcome the new Government headed by Shri Morarji Desai, whose high intellect is embellished by great wisdom and on whose capable shoulders is the task of building a new destiny for this nation. We wish him and his colleagues in the Government godspeed and assure them of our whole-hearted support.

The Janata Party's election promises to shift development outlays in favour of agriculture and to promote rural employment and small scale industry are in line with the aims of this Association itself. Since 1960, agriculture did not have its due share of planned outlays. Emphasis was on heavy industries. Shift to agriculture is in offing. Irrigation and other inputs are expected to receive greater attention. Favourably located as we are, in the years to come, India would acquire dominant role of supplier of processed foods manufactured from an abundance of crops of agriculture produce including fruits, vegetables, spices, cereals, etc. Our today's low production per hectare is way behind world standards, whereas our climatic and geographical placements would enable us produce far more than the world standards. Food preservation is one of those industries which have considerable employment potential as it is a labour intensive industry. It is said that every additional tonne of vegetable or fruit product could find jobs for 150 persons. The total production of fresh vegetables and fruits in this country is about 32 million tonnes. Some 20 per cent of this goes waste. If even a fraction of this is preserved, it could mean an additional million jobs. It is, therefore, necessary for the new Government, which has to fulfil its electoral promise of increasing employment in rural areas, to take a close look at this industry and give it a pride of place as an employment generating industry.

This close look will reveal that while the potential of this industry is certainly great, most units at present have to battle with adverse circumstances and quite a few have closed down. I wish the Government consider why this is happening. The basic problems are many and well-known. One of these is that the high prices of sugar and containers are jacking up the prices of preserved vegetables and fruits, pricing them out of the domestic market and threatening the exports outlets. The industry has to bear heavy excises and other taxes. Annually we waste several thousand tonnes of food materials because we do not have

preserving facilities and industries on the requisite scale. But where such industries come up, the Government seems to be taxing them out of the market. This is an unhappy paradox. In our climate, spoilage of fruits and vegetables is today considered inevitable. Preservation by canning, cold storing or freezing, dehydrating, pickling and by all available means is essential. Making seasonally growing produce available year round to meet the needs of our people and exports is also the role of our industry. Absence of food would make our planet uninhabitable and our food preservation industry is a direct support to life and farms. I appeal to the new Government to end this state of affairs. We are asking this not just to help ourselves but to ensure that this industry expands to stabilise and provide the market for farm produce and thereby help a national task. Apart from across the broad cuts in taxes, it must do something about the cost of sugar. If the present dual pricing system is replaced by a single price, it should be possible for the industry to get sugar at lower cost and thereby cut prices of its products. The Government and the industry must put their heads together to cut costs of packaging. In place of tin containers, we have to devise cheap dispensable containers if ever we are going to solve this problem created by costly tin which has to be imported. In fact, it is in packaging that the industry is in need of a big technological break-through. The industry by itself is not in a position to invest in research for this purpose mainly because of its narrow base and low profitability. And that is where the Government would have to step in through its net-work of laboratories to find a solution. I can assure the Government that the return will be greatly rewarding.

Science, technology, nutrition, studies in longevity and scores of other disciplines have revised people's outlook and food habits. The processed food industry will have to closely watch the changing requirements of the people. Studies by Harward's Dr Leaf and other scientific authorities have proved beyond all doubts that common features among people with world's highest longevity, viz., Hunza's of North India, Cossacks of Caucasus and Vilcabamba's of Equador are all essentially living on vegetarian diets comprising of vegetables, fruits, whole grain cereals and milk products. India can be a great provider of these healthy and longevity giving foods.

Nature has gifted us not only shorter time cycle of crops, but higher degree of photosynthesis, which enable us grow C-4 plants; chlorophyll in which converts maximum sun energy into foods. Percentage-wise, our arable land area is definitely most outstanding because in most parts all over the country, we can easily take three crops a year on an average, whereas countries like U.S.S.R., China, Europe, Canada can take 1½ crops a year and even U.S.A. 2 crops a year, on an average. All these go to show that we have the necessary nature's benevolence and infrastructure which can take our industry on road to viability and even prosperity.

The rising demand for Indian vegetables and fruits abroad should act as a catalyst in organising a countrywide increased outputs and food preservation network of units. During the year, we have successfully persuaded the Government to announce reasonable cash assistance on exports not for one year, but for longer period viz. 3 years. The availability of tinplates and other packaging materials which was so much in short supply had also improved during the course of the year. Reasonably good monsoon has helped us with all agriculture produce we needed. The result was very substantial increase in exports of processed foods during the first

eleven months of the current financial year viz., April '76—February '77, totalled Rs. 86.08 crores as against Rs 42.70 crores during the corresponding period of last year, thus registering an increase of over 100 per cent. The target of Rs 71.66 crores fixed for the full year 1976-77 has been exceeded by 20 per cent. It stands to reason that we encourage the export of value-added items rather than fresh fruits and vegetables. The Government, in response to our demands and public outcry, banned the export of fresh vegetables. This is a commendable step. Government, I hope, will make it clear that exports of only value-added items will get its support.

Our domestic market continues to be dominated by bulk consumers and the household consumers account for only 20 per cent of the consumption. It is against high cost of packaging and of preservatives like sugar plus excises which mark up the value of the final product and price it out of the household sector. I have already referred to the technological break-through we are awaiting in packaging. If we could also devise means of making available, for instance, fruit juices to household section at less than a rupee a glass, I am sure there will be a tremendous boost to our domestic demand. India has a long and dry summer and thirst is a big problem. We are unable to cater to this need because firstly of technological limitations and secondly the high prices of sugar and heavy taxes. With a little more technological ingenuity, we could make available seasonable vegetables round the year. More and more women are going to work and surely they will prefer ready-to-eat vegetables, fruits and ready-made curries. The efforts so far in this direction have been only marginally successful or in many cases, a failure.

I have referred to these problems only to emphasise that the industry is unable to tap the vast potential due to its present limitations. The Government ought to realise that this is an industry still in its infancy in our country, though abroad it is highly developed and employs millions; and what it needs is careful nursing and not the heavy bludgeon of taxes. If the Government realises that the industry is doing a national service by preserving vegetables and fruits which otherwise would have gone waste, it would itself reconsider its logic of imposing excise duties on an activity which is in public interest.

I am also of the opinion that the industry itself should try to do as much as it can for its growth.

In my last Presidential address also, I stressed the need for a Consortium approach in market research. This is a field in which we hope the new Government would cooperate with us and put in a little extra effort to help. Your Association on its part is prepared to do all it can.

The Association has already spent Rs 45,000 on a market research survey conducted by the Indian Institute of Foreign Trade. The copies of this survey report have been made available to various departments of the Government. We hope the findings make a substantial impact on Government policies in this sphere. We expect to have evidence of it in the forthcoming budget itself. This survey, which is the Association's signal achievement over the last year, is but one part of its several activities. But it has already depleted our finances. We must consider how to improve these. The Association, I am glad to report to you, has now increased membership to 128 from 108 last year. It has taken pains to attend all the meetings called by the CCFS and CFPAC. It has actively participated in the meetings of the Fruit and Vegetable Preservers' Panel of the Development Council for Food Industries, set up by the DGTD. The

active interest the Association took in the welfare of the industry has helped it to secure extension of cash compensation and other benefits and also to remove some of the constraints in getting such reimbursements. The Association has also battled with the Government agencies implementing the Prevention of Food Adulteration Act, wherever inspection and certification appear to be faulty and defective. The approach of the Association in this has not been to compromise with quality. We cannot and shall not be compromising where quality and public health are concerned. What we are striving for are proper, uniform and practicable inspection procedures, adequate laboratory facilities and foolproof analysis. I strongly urge the Government to sit with the industry and evolve these procedures so that quality control becomes both of the highest standard and greatest practicability.

I consider it a great honour that you elected me to lead your organisation for two consecutive terms. At the end of these two years, I have some sense of achievement at the work we have done in this Association. I must here record my appreciation of the very valuable help your Honorary Secretary, Shri Y. K. Kapoor, has given in this work. As I have said earlier too, he is the live-wire behind this Association. I have also been receiving all help and valuable suggestions from the members of the Executive. I would also thank the Honorary Editor and Editorial Board of the 'Indian Food Packer' for their useful work. We have received valuable co-operation from many Government agencies and officers and the CFTRI and its Director, Dr Amla. I am thankful to them all. I have no doubt that this Association has a bright future before it. The country itself is at a watershed of history. A new economic policy with emphasis on rural growth has been promised. Agro-industries, therefore, should occupy the centre of the stage in this new policy. As such, our Association is bound to be called to play an increasingly important role in shaping the economy of the country. I hope we are prepared for this challenge. I wish you all success. Thank you.

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INAUGURAL SPEECH

SHRI R. BALASUBRAMANIAN
Food Secretary

I am happy to be with you today on the occasion of your Annual General Body Meeting. Earlier, I have been the Chairman of the Processed Foods Export Promotion Council and also of the Central Fruit Products Advisory Committee. I was also Chairman of a Committee on rational development of food industries which submitted a report to Government in August 1971. I have thus been greatly interested in the development of processed food industry and particularly, the fruit and vegetable processing industry.

I am well aware of the importance of the fruit and vegetable preservation industry in that it can help in providing remunerative prices to the farmers, provide largescale employment to unskilled workers and also help generally in the development of rural economy. Apart from this, it helps in prevention of wastage of valuable food material.

India is well suited for the production of fruits and vegetables, blessed with both tropical and temperate climate. I am told that of the total estimated production of about 32 million tonnes of fruits and vegetables, 15-20 per cent is wasted. The industry apparently caters to the processing of less than 1 per cent which is a fraction of the fruits and vegetables that go waste. There would thus appear to be considerable scope for the industry to expand and prevent this wastage. Yet, I understand that even the existing capacity for processing fruits and vegetables is not fully utilised.

I have listened with interest to some of the problems referred to by the President in his address. He has mainly referred to the necessity to reduce the excise duty and to supply sugar at cheaper rates to the industry for meeting the demand for home consumption. Iam afraid that these requests have continued to be made year after year and so far there has been no tangible result. While one has to admit that for an industry of this type to develop, certain assistance in this direction may be necessary; it would not be proper to concentrate on this alone and not pay attention to other areas where some improvement is possible. It is seen that more than 50 per cent of the production of the industry goes to meet the export demands and the demands of the Armed Forces; the domestic market taking the balance i.e. less than 50 per cent. Ours is a very large country with considerable potential for developing the domestic market. The industry cannot depend on the export and the requirements of the Armed Forces alone. It is necessary for the industry to take steps to develop the internal market. The main reason for the low offtake in the internal market of the product is the high price of tinned fruits and vegetables. Since, in the country, fruits and vegetables can be grown in almost all the seasons and fresh fruits and vegetables can be made available to the consumers by suitable marketing and transport arrangements, it has to be recognised that the industry has to compete against the availability of fresh fruits and vegetables at lower prices. Taking these factors into consideration, the industry will have to take suitable steps to develop the internal market by paying attention to marketing aspects through proper studies and also undertake

necessary promotional and developmental programmes. A constant watch has to be kept on the price of products and every effort should be made to adopt such measures to reduce the prices to the extent possible.

In this connection, it has to be mentioned that the industry is producing the same type of products as were in demand during the last two decades or so and which are aimed mainly at Defence and export markets. If the internal market is to be developed, it is necessary to do a proper market study and to diversify the production in order to provide the consumers different types of products, which may find ready acceptance. With domestic help becoming more and more difficult to obtain and with more women, particularly of the middle class, in the country seeking employment, there should be a good potential market for what may be called convenience foods viz., pre-cooked and fully processed vegetables and this has to be explored.

Another area which needs the attention of the industry is the proper development of the fruit and vegetable production in the country. Just as the sugar factories are expected to pay attention to the cane production in their area and to take steps to increase the productivity as well as the quality of cane by suitable steps, it is necessary that the processing industry also should take similar steps to increase the productivity and the quality of the fruits and vegetables grown in the area from which they draw their supplies. The present practice of the industry to buy fruits and vegetables in the markets during the production season, perhaps, is not a satisfactory arrangement of ensuring a steady flow of raw materials. The operation of an intermediary between an individual farmer and the processor cannot be a satisfactory arrangement as for one thing, it reduces the price which the producer gets and cannot, therefore, enthuse him to increase production and to keep up a steady supply. A direct contact between the producer and the processor would be a much more satisfactory arrangement and this, while providing a remunerative price to the farmer, will also ensure a steady supply at reasonably constant price to the processor. It will be necessary for the processor not only to keep direct contact with the producer but also to help him by offering necessary inputs, technical advice etc., so that the productivity could be increased and production could be arranged of varieties suitable for processing.

Another factor which makes the products of the industry too costly for the average consumer is the cost of packaging. I am told that the selling price of one kilo of pineapple slices is Rs 8 while the cost of the raw material inclusive of the cost of sugar is only around Rs 1.50 or so. This illustrates amply how the processing and packaging add cost to such an extent to the product that it goes beyond the reach of the ordinary consumer. I am glad that the President has also referred to this in his speech. It is necessary that more attention should be paid to the problem of packing and attempts made to evolve cheaper packaging materials so that the cost of the product is reduced and the internal market could expand. One possible suggestion could be introduction of returnable glass jar. I understand that this type of packaging is common in some countries abroad. The possibility of bulk packaging to cut the intermediate cost could also be considered. But what is necessary is to go in a big way for research and developmental work to look into this problem. I would suggest that the Association should work out detailed proposals for this and, if necessary, approach the Government for assistance.

Besides this, other sources of economy would also have to be located. For example, one possibility could be to improve

the economy of production by utilisation of the factory wastes. Here again, considerable research work would have to be taken up and my own Department would also be looking into this problem.

One would have expected that with the capacity of the industry not being fully utilised, the availability of processed fruits and vegetables in the internal market would not be a problem. But surprisingly enough, it came to my notice that recently, the Army Purchase Organisation was not able to obtain their full requirements as the processors seemed to prefer to export their products rather than make supplies to the Defence Forces. With the capacity not being fully utilised, I have not been able to understand why the processors did not come forward to offer supply to the Defence Forces, if necessary, by increasing their capacity utilisation slightly higher. I would only like to stress here that the industry cannot survive by depending on exports alone and that it is necessary for the industry to see that the needs of the Defence Organisation are fully met. It is indeed the national duty to do so. I hope this sort of difficulty which arose in obtaining supplies to the Defence Forces will not arise in future and that the industry would play its part in the national interest.

The Department of Food is taking all possible measures to encourage the development of fruit and vegetable industry and also to develop consumer acceptability for such foods. In this context, Government has already set up 25 Community Canning and Fruit Preservation Centres in different states which has created awareness of the role of preservation of fruits and vegetables. As a promotional effort, we are also setting up a fruit juice bottling plant which would utilise fruit juice concentrate produced in the country, and, at the same time, making available nutritious fruit juice beverages at a reasonable cost. In order to provide the technical personnel for the industry, arrangements have been made for training personnel in fruit and vegetable preservation in the catering colleges and Food Craft Institutes set up by the Food Department. For top management position, we have also sponsored an advanced course in the CFTRI, Mysore.

Another important development in this field is the integrated approach of production, processing and marketing of fruits and vegetables. Government is considering setting up two Agro-Industrial Complexes with this integrated approach in Karnataka and Bihar. This involves the production of suitable varieties of fruits and vegetables for processing as well as marketing both for internal consumption as well as for export. In this endeavour, we are expecting to receive Bulgarian assistance.

It is gratifying to know that there have been considerable increases in export of processed fruits and vegetables. Government is providing whatever incentives are necessary for increasing the export. The Department of Food has also introduced a continuous inspection scheme at the factory level as well as the preshipment inspection scheme. I am aware of the limitations in the proper implementation of this scheme for want of adequate staff. But I can assure the industry that we are taking steps to increase the staff wherever possible. This would give an assurance to the importers of the proper quality of the product and has already created confidence in them.

I have tried to share some of my random thoughts with you all. I would indeed be interested in the deliberations and your recommendations that might emerge. I am sure that you will consider some of the points that I have made in the short time that you have given me. With these words, I have great pleasure in inaugurating the 34th Annual Conference of your Association.

KEYNOTE ADDRESS

Dr. D. N. Saxena

Director-General, Indian Institute of Foreign Trade, New Delhi

Mr President and Friends,

It is indeed a matter of privilege to me to be with you on this important occasion of the 34th Annual General Meeting of the All India Food Preservers' Association. I feel that the Association has done a singular honour to me by asking me to deliver the keynote address.

May I first start with emphasising the obvious? In a country like ours with vast human resources, an endeavour essentially based on labour-intensive techniques and operating on a decentralised basis is the kingpin of balanced development with social justice. Vegetable and fruit preservation industry falls in this category and thus efforts to strengthen its base and impart it a degree of dynamism deserve all support. I am glad to know that this is what your Association has precisely in mind.

The importance of the fruit and vegetable preservation industry lies not merely in the fact that it provides employment on a decentralised basis, but also in the fact that it results in the augmentation of farmers' income and thus provides a valuable support to the agricultural sector. Then there is also the contribution by way of exports, although so far this industry's contribution in this form is rather modest.

The country's current foreign exchange position is very comfortable and our exports have shown a considerable amount of resilience. However, it would be wrong to take the line that we have already turned the corner and now can rest on our oars. Efforts on the export front must continue relentlessly. A continuous dynamism has to be imparted to all endeavours with export potential. The only caution which we have to take is that exports should not be at the expense of domestic needs and requirements.

The potential that is offered by the processed fruits and vegetables industry both in the matter of production and exports is yet to be fully exploited. Indian Institute of Foreign Trade had undertaken a comprehensive survey on the export potential of this industry as early as 1968. That study had visualised considerable growth prospects both in terms of products and countries. It was anticipated that exports of this sector would reach the level of 1,40,000 tonnes valued at Rs 29.5 crores by 1975-76. Unfortunately these expectations have not materialised, though exports of processed fruits and vegetables reached the all time high of Rs 9.15 crores in 1975-76 as against Rs 1.50 crores in 1961-62. This is good as far as it goes but for an industry that came into being during the late twenties, Rs 9 crores worth of exports is hardly a matter of much pride. For a country which has a wide and varied production of 32 million tonnes of fruits and vegetables, exports of about 15,000 tonnes in processed form touch only the fringe of the immense potential that the industry offers. I have no doubt in my mind that your industry can achieve much greater heights on the export front provided it is given positive export orientation.

Apart from foreign exchange earnings, your industry has a number of strong points,

which could be the basis of a very dynamic industrial set-up. The foremost among them is that it is based on indigenous resources. Most of the raw materials required, namely, fruits and vegetables, sugar, salt, vinegar and preservatives emanate from local sources. Even some of the sophisticated machinery required for processing is being fabricated locally. Bottles are available locally. We, however, continue to depend upon foreign sources for citric acid and tinplate. CSIR's Regional Research Laboratory located at Jammu, which I had the good fortune of visiting last month, has done commendable work in producing citric acid from indigenous material. What is essential is that the good work done by the Jammu Institute is translated into commercial ventures and this is where the question of entrepreneurship assumes importance. In the matter of tinplate too, there is also a ray of hope in as much as Rourkela Steel Plant is augmenting its production and is expected to meet the full requirements of the industry during the current year.

Prevention of colossal waste of fruits and vegetables in growing areas is possible only through setting up of canning units. They offer the real marketing outlets to the farmers and avoid distress sales during glut, thereby ensuring a fair price to the farmers. Similarly welfare of the people of hill areas and backward regions and proper utilisation of fruit and vegetable resources can be ensured through processing units.

As a source of employment of farmers, factory workers and entrepreneurs, the usefulness of this industry can hardly be over-stressed. Yet another significant function of the industry relates to the requirements of Defence services. It is this industry which is able to sustain the food supply lines to our brave soldiers guarding the frontiers of India at places sometimes not connected through normal communications.

The convenience and comfort offered by the industry, ensuring availability of fruits and vegetables in canned and bottled form throughout the year in almost 'ready-to-eat' form, is the measure of sophistication achieved by the industry.

Against the background of so many vital functions that the industry performs, the growth achieved by the industry during the last 40 years cannot be considered as significant. This is particularly so in respect of fruit and vegetable products as opposed to omnibus line of FPO products which also include synthetic products, namely, aerated waters, synthetic jellies, synthetic syrups and synthetic vinegars. Production of fruit and vegetable products in the country today is only 55,000 tonnes, a relatively low figure viewed in the context of the rich and varied natural resource endowment of the country.

The questions that naturally arise are as to how this industry, which has the requisite strength and vitality, is unable to play its full part in the national development. What is impeding the progress of this industry and what are its weaknesses?

An attempt was made by the Institute to diagnose the problems responsible for this static growth through a study made on behalf of your Association. The study has identified a none-too-happy position of the industry in respect of various crucial aspects. The domestic demand so essential for the healthy and orderly growth of this industry, for that matter any industry, is greatly impeded by the levy of a multiplicity of indirect taxes and duties resulting in steep escalation in production costs. This inevitably results in exorbitant retail prices rendering the products almost beyond the reach of the common man.

A close scrutiny of the demand pattern reveals that of a total production of 55,000

tonnes, exports constitute only 15,000 tonnes with balance representing domestic demand. There are three distinct segments of the domestic demand (*i*) Army Purchase Organisation (APO) and Canteen Stores Department (CSD); (*ii*) Hotels and Restaurants; and (*iii*) Household Consumers. The demand estimates show that purchases of APO and CSD account for 8,000 to 10,000 tonnes, hotels and restaurants 7,000 to 10,000 tonnes and purchases by household consumers are around 20,000 to 25,000 tonnes. Statistically this would mean that a country with a population of over 600 million consumers uses processed fruits to the extent of only 25,000 tonnes annually—a *per capita* consumption of only 40 g.

The augmentation of the domestic demand very largely depends upon the ability of the industry to popularise its products among the household sector. This is a sector which is most vital for the sustained growth of this industry. It has been established by the IIFT study that domestic demand is basically governed by price considerations. If the prices are to be stabilised at some reasonable level, downward adjustment in the heavy fiscal imposts on the industry would have to be made. Resultant increase in demand would lead to increase in production thereby ensuring better utilisation of the existing capacities and ensuring that exchequer receipts do not decline. The present capacity utilisation of the industry at 30 to 40 per cent is low by any standard and therefore any attempt at fuller utilisation of the capacity would curtail over-heads, reduce production costs, stimulate demand, generate larger export surpluses and improve competitive capabilities.

The last fifteen years have witnessed a three-to-four-fold increase in the retail prices of the processed products in the country. The Institute's study has shown that the burden of taxes and duties in the ex-factory cost of production as well as element of taxes and duties in the final consumer price have been largely responsible for this steep price increase and resultant subdued domestic demand.

Subsidiary raw materials like sugar, citric acid, essences and colours as well as packing materials like cans, glass bottles, jars and cartons have to bear taxes and duties at various levels. Studies have shown that the element of indirect taxes in ex-factory cost of production varies anything between 15 and 28 per cent. Apart from this, there is excise duty of 10 per cent *ad valorem* imposed on the finished products. To add to all this, the products attract additional taxes and duties such as central excise, sales tax, octroi duty and state sales tax at the time of their marketing. The IIFT study has shown that the incidence of taxes and duties varies from 30.6 per cent to 52.9 per cent to the consumers of these products in Bombay. Understandably, the average consumer has still not accepted this product as a regular part of his menu. Therefore, demand for these products in the country has been sluggish.

Quite often one comes across a mistaken notion that the products of this industry are only meant for rich and affluent having no place in our socio-economic set-up. This is definitely an erroneous impression specially in the context of the various socio-economic advantages outlined earlier. The endeavour should be to keep the prices of these products at a reasonable level with a view to popularising them among the common consumers. This is where both the industry and the government have to get together to correct this erroneous impression.

For giving the rightful place to this industry in our national economy, a sound strategy of development is an essential prerequisite. Various components of this

strategy would include: (*a*) building up performance efficiency by the industry through integrated approach from raw materials through marketing; (*b*) new product development keeping in view regional as well as national requirements of domestic consumers and export markets; (*c*) standardisation of package designs; (*d*) market research studies; (*e*) publicity and promotion aimed at consumer level and (*f*) the reduction of the fiscal burden at the nascent stage of the industry.

The industry has to forge links with the growers of fruits and vegetables to ensure uninterrupted supply of quality raw materials at reasonable prices. For example, in all the major producing and exporting countries, the industry has adopted an integrated approach either by having own plantations or procuring supplies on the basis of contract farming. Barring a few exceptions, where the results have been encouraging, this approach has not yet gained acceptance in our country. It is high time that due recognition is given to this aspect of integrated approach in the processed fruit industry. Attempts will have to be made to streamline the distribution system through elimination of certain avoidable links in the chain of distribution with a view to affecting cost reduction and lowering prices.

The industry should put in more efforts on research and development, specially in the areas of newer products and by-products utilisation. It appears that the product-mix of the industry has remained virtually stagnant since its inception. Especially when the domestic demand is not picking up, efforts should have been made for developing newer product lines meeting the taste and climatic requirements of Indian consumers. The approach has to be consumer oriented with newer products being developed for catering to the varied tastes and preferences of Indian consumers.

Exports have been increasing but not much diversification in terms of products and markets has taken place. Various products based on peaches, pineapples, citrus fruit and tomatoes are top sellers in the international markets whereas our exports continue to be largely mango-oriented. While every effort should be made to sustain and expand the exports of mango products, permanent stakes in the world markets could be based on our larger penetration into the internationally accepted fruit and vegetable products.

Gulf constitutes a growth market for our products. For consolidating and expanding our share of this market, special care will have to be taken to produce products as per the requirements of Gulf consumers. It is understood, for instance, that export of juice should have 45 per cent pulp content and be packed in lithographed containers. Easy open cans (flip top end) should be adopted for this market. Packing of juices should be in 260g $\times$30 to a carton with pull ring ends. Similarly, 'twist off caps' are to be adopted for packing jars. Peas and other vegetables are preferred in packages of 10oz. cans. These are aspects which should be carefully examined by the industry and suitable modifications and adaptations made.

In conclusion, I suggest that your Association has to play a very vigorous role in the overall development of this industry. Marketing research must be undertaken on more continuous basis since it is not possible for an individual unit to spend money on these studies. The Association has to have a regular link with the Government for apprising it of the problems encountered by the industry with possible solutions. Schemes should be evolved for launching publicity and promotion programmes to create right image for Indian products in world markets. And finally but by no means less significant is the aspect of quality control.

With the congenial atmosphere that is prevailing in the country, I am confident that there will be greater understanding and sympathetic consideration of the problems encountered by your industry from all quarters, including Government.

I once again thank the Association for giving me this opportunity to address this meeting.

I wish all success to the deliberations of this Conference.

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K. U. PATEL MEMORIAL AWARD

The K. U. Patel Memorial Award was presented to Dr M. Mahadeviah for his paper 'Internal Corrosion of the Tinplate containers with Food Products' published in the March-April 1976, Vol. XXX, No. 2 issue.

K. U. Patel Award was instituted in the year 1970 after the retirement of Shri K. U. Patel, as President of All India Food Preservers' Association, for the best paper published in a volume. After his demise two years later, it was named as K. U. Patel Memorial Award. Till 1975, the award consisted of Rs 500 in cash and a certificate. From 1976, the Association has increased the amount to Rs 1,000. The following papers have been awarded in the previous years:

1. 1970-Vol. XXIV, No. 4, July-August Citrus Beverages—Manufacture and Quality Control by S. Ranganna and B. Raghuramaiah, CFTRI, Mysore.

2. 1971-Vol. XXV, No. 2, March-April Contribution of a Modern Fruit Processing Plant to Economic Development by Smt. G. V. Kamala and Dr S. M. Khot, Department of Industrial Management, Indian Institute of Science, Bangalore.

3. 1972-Vol. XXVI, No. 2, March-April Microbiological Standards for Foods—Prospects and Prospectives by Dr Guru Prasad A. Sulebele, Department of Chemical Technology, Bombay University.

4. 1973-Vol. XXVII, No. 5, September-October—Studies on Preservation of Poultry Meat by Curing and Smoking by Nagendra Sharma, T. D. Mahadevan and Dr B. Panda, Indian Veterinary Research Institute, Izatnagar.

5. 1974-Vol. XXVIII, No. 1, January-February—Pink Discolouration in Canned Fruits and Vegetables-Guava (*Psidium guajava* Linn), by Dr S. Ranganna, CFTRI, Mysore.

6. 1975-Vol. XXIX, No. 5, September-October—Volumetric Determination of Zinc Dialkyl Dithiocarbamates and Carboxymethyl Dithiocarbamates by K. O. Abraham, M. L. Shankaranarayana, B. Raghavan and C. P. Natarajan, CFTRI, Mysore.

Dr M. Mahadeviah, Scientist, CFTRI, Mysore, received K. U. Patel memorial award for 1976 for his paper entitled 'Internal corrosion of tinplate containers with food products' published in March-April 1976 issue of Indian Food Packer. The award was presented at the 34th Annual Conference of the All India Food Preservers' Association held in NewDelhi on May 25, 1977.

Dr Mahadeviah is a B.Sc. graduate from Mysore University. He has passed the post-graduate Associateship Course in Fruit and Vegetable Technology at CFTRI, Mysore, during 1962 and secured first class in the examination. He has also passed Associateship of Institute of Chemists (India) during 1965. He was awarded Ph.D. degree in Food Technology during 1975 by the University of Mysore for his thesis entitled 'Studies on the corros-

ion of tinplate containers with some fruit products and their constituents'.

After completion of his studies at CFTRI, he joined the Directorate of Marketing and Inspection (Govt. of India) at Madras as Inspector of Fruit Products during 1962. In 1963, he worked as Assistant Production Manager at Nagpur Orange Growers' Association, Nagpur, for a short period. Then, he joined CFTRI and he has worked on a Project on 'the evaluation and corrosion of tinplate containers for packing food products'. The special emphasis of this project was the utilization of indigenous tinplate and inhibition of corrosion in food containers. He has published about 30 review and research papers in various Indian and foreign journals.

During 1971, he visited East Germany and U. K. under the exchange programme with the German Academy of Sciences, Berlin, to study the latest techniques and developments in canning and preservation of fruit and vegetable products and tinplate technology. He was the Councillor of the Association of Food Scientists and Technologists (India), Vice-president and Secretary of CSIR Scientific Workers' Association, CFTRI Branch.

At present, he is continuing his research work on the suitability of various metal containers for packing food products.

PADMASHRI N. N. MOHAN MEMORIAL AWARD

Padmashri N. N. Mohan Memorial Award was presented by Shri R. Balasubramanian for the paper entitled 'Determination of Optimum Maturity in Peas for Canning for Indian Preparations' by S. Chakraborty, S. R. Sampathu, H. C. Bisht, Kamal Prakash and N. K. Saha (Central Food Technological Research Institute Experiment Station, Lucknow) published in November-December 1976, Vol. XXX, No. 6 issue.

The Award has been instituted in 1976 by the House of 'Mohmeak's' to perpetuate the memory of their founder, late Padmashri Narinder Nath Mohan. The Award consists of Rs 1,000 in cash and a certificate given to the best research paper in a volume.

Padmashri Narinder Nath Mohan was born in a middle class family on 25th October 1901. He started his business on foot and progressively took to bicycle, tonga, motor cycle and an old car. He became the Financial Adviser and raw material supplier to Murree Brewery, Rawalpindi. He invested whatever was available to him in the ailing Dyer Meakin Breweries at Solan and helped it to achieve a new lease of life. He became its first Indian Managing Director. He died on 15th July 1969 at the age of 70.

He was opposed to forcing people to a way of life against their will but was in favour of the maximum denial by choice. Although being in the business of manufacturing and selling liquor, he abstained totally from its consumption and also urged his staff and workers to follow his example.

He aimed on making money, and succeeded in that. That enabled him not only to live a good life himself but also to help his near and dear ones and also many public causes through liberal donations. Many educational, cultural and service organisations thrived on his liberal support.

Since his was the philosophy of living nicely and virtuously, throughout his life he worked for that. He had achieved in life what he had aimed at. He died in perfect contentment.

From his early youth, Shri Mohan had been a disciplined person. As he advanced in years, he developed qualities of high moral standard based on firm and solid principles. He was regarded as symbol of high thinking and simple living not only by his family members but also by the entire staff and others who had the fortune of being associated with him. He was a staunch teetotaller and non-smoker. Calm and collected, he used to remain unruffled in the midst of stress and instead inspired confidence among his friends, associates and workers. He always called upon his employees to march on.

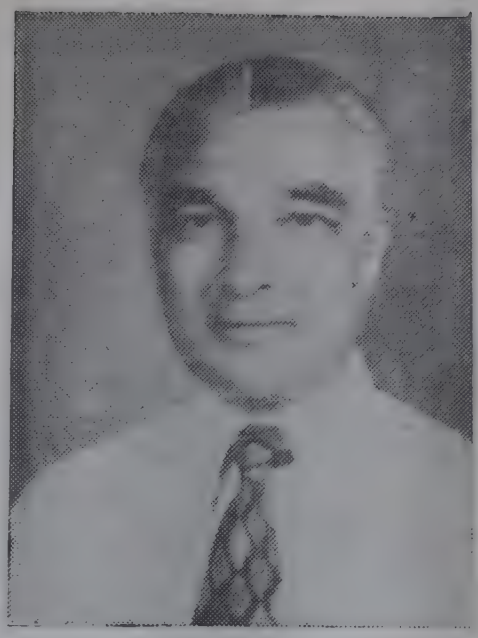
The house of Mohmeak's is in the able hands of his sons Major Kapil Mohan and Shri Sukh Dev Mohan and brothers Hari Chand and B. S. Mohan.

Shri N. K. Saha

Shri N. K. Saha is the Project Coordinator, Central Food Technological Research Institute Experiment Station, Lucknow.

Shri Saha obtained his B.Sc. degree with distinction in Chemistry, Physics and Mathematics from Calcutta University in 1943. He obtained the Diploma in Fruit and Vegetable Technology from the Indian Institute of Fruit Technology, Lyallpur, Punjab, in 1946-47 securing First Class First position.

Shri Saha is actively associated with



Fruit Preservation Industry since 1945. He has worked as Production Manager in S. R. Cannery, Allahabad and TIMS Products Ltd., Calcutta. In 1950, he joined the Govt. Constructive Training College, Lucknow, as Technical Assistant to establish the Fruit Technology Section. In 1954, he joined the Directorate of Fruit Utilization, U.P. and worked there in various capacities till 1961. He was the Chief Chemist-cum-Production Manager of Govt. Fruit Processing Factory, Ramgarh (Nainital), which was the first of its kind to pack apple juice and sulphited pulps in bulk. As Chief Instructor, he organised the Diploma Course in Fruit Technology at the Govt. Fruit Preservation and Canning Institute, Lucknow, which is now a permanent training institute.

Shri Saha joined the Central Food Technological Research Institute, Mysore, in 1961, as Senior Scientific Officer, and was posted as Scientist Incharge, Experiment Station, Bombay. Later, he was transferred to Lucknow in 1963 to establish the Experiment Station at Lucknow, where he is engaged in conducting research work on the screening of important commercial varieties of fruits and vegetables of the region for processing, development of pro-

cesses, and solving the problems of industry. He has wide experience in production, teaching, research and extension work and has a number of publications to his credit.

Shri S. Chakraborty

Shri S. Chakraborty is a Scientist in Central Food Technological Research Institute Experiment Station, Lucknow.

Born on 30 March 1939, he graduated in Science from Bihar University in 1959 and was awarded diploma of Associateship of Institution of Chemists in 1967. He has done Elementary Course in German Language conducted by Max Mueller Bhawan, New Delhi.

He joined Food Inspection Organisation, Ministry of Defence and served there from 1962 to 1970. During this period, he acquired a sound knowledge about quality control and inspection of food and allied products including processed foods. He also acquainted himself with the development of food processing industries.

In 1970, he joined CFTRI and was posted at Experiment Station, Lucknow. Shri Chakraborty has made modest contribution in the field of fruits and vegetables with a special reference to the processing industry. He is engaged in research and developmental work related to the problems of the region.

Shri Kamal Prakash

Born on 2nd September 1943, Shri Prakash obtained his M.Sc. (Organic Chemistry) degree in 1969 from Meerut University. He has also passed certificate course in German Language in 1974 from Lucknow University. He took keen interest in games and sports in his student life.

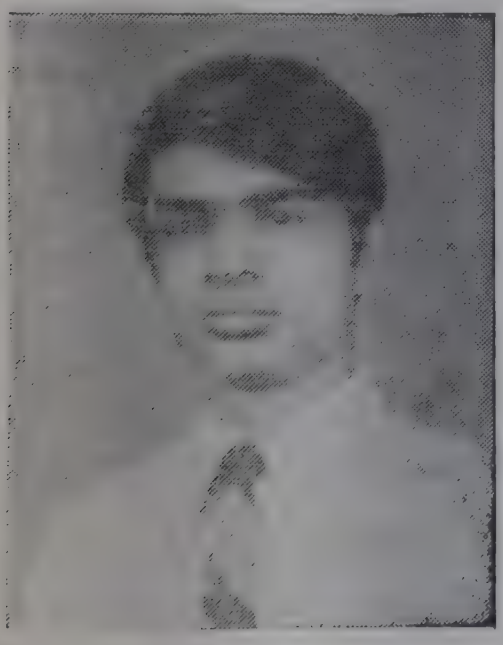
Shri Kamal Prakash worked for a short period in Indian Institute of Petroleum, Dehradun. In 1970, he joined CFTRI Experiment Station, Lucknow, as Junior Scientific Assistant. He is engaged in research work in the area of fruits and vegetables and has contributed a lot in the various projects of this Experiment Station. Shri Prakash is a 'Masonic Brother'.

Shri H. C. Bisht

Shri H. C. Bisht, born in 1941, passed B.Sc. from Lucknow University in 1961. He joined the C.S.I.R. in 1964 and has gained considerable experience in different laboratories of the C.S.I.R. He has worked

in the Phytochemistry Division of National Botanical Garden, Plant Physiology Division of Regional Research Laboratory, Jammu and now, since 1967, is with CFTRI. He has wide experience in the analyses of fruits and vegetables and contributed much in the field of food science.

Shri S. R. Sampathu



Shri S. R. Sampathu is working as a Scientist at the Central Food Technological Research Institute, Mysore, since 1976. He graduated from the Sarada Vilas College, University of Mysore, in 1967. He was a recipient of the Government of India National Scholarship for Merit throughout his graduate career. He passed M.Sc. (Food Tech.) with distinction from the FAO International Food Technology Training Centre, CFTRI, Mysore, in 1969. He joined the CFTRI Experiment Station, Lucknow, as a Senior Scientific Assistant, where his work mainly related to preservation of Indian sweets and canning and dehydration of fruits and vegetables.

KASHALKAR MEMORIAL AWARD

The Kashalkar Memorial Award was presented by Shri R. Balasubramanian to Shri K. C. Dé. The Kashalkar Memorial Award consisting of a Gold medal is given annually to a person who in the opinion of the Association has rendered yeomen service to the Food Processing Industry. The following have received the award since 1964:

1966 Shri K. U. Patel
1967 ,, H. C. Bhatnagar
1968 Dr H. A. B. Parpia
1969 Shri B. B. Sardesh Pande
1970 ,, V. B. Oberoi
1971 ,, Daya Nand
1972 ,, Y. K. Kapoor
1973 Dr A. G. Naik-Kurade
1974 Shri P. H. Bhat
1975 ,, Kisan Mehta

Dr A. G. Naik-Kurade read the citation.

Shri K. C. De

Born in Calcutta in 1929, Kamal Chandra Dé graduated with first class honours in Chemistry in 1949 from Presidency College, Calcutta University. Thereafter, he took B.Sc. (Tech) in Chemical Engineering at the University of Manchester, U.K., in 1953.

Shri Dé joined the Research Department of the Metal Box Company of India Ltd. in 1956 as Chemist and two years later was promoted to Senior Chemist.

In 1960, he joined the newly set-up Customer Research of the Company which involved providing field service to customers on packaging problems, particularly in respect of the processed food packaging. In 1965, he became the Head of Customer Research Service and was thereupon responsible for managing all Customer Research Service activities of the Company. He toured widely within the Country and to Ceylon and Thailand on processed food advisory work.

In 1972, Shri Dé was promoted as Manager of the Research Department, Metal Box Company of India, Calcutta, comprising 12 laboratories.

He visited Metal Box, U.K., establishments three times on training and conferences. He took the Senior Executive Course at Administrative Staff College, Hyderabad, in 1972. In 1962, he toured Denmark and U.S.A. as member/secretary of an Indian Productivity Council team on Processed Foods.

As part of his activities in Customer Research Service and research work in the laboratory, he has been concerned with a variety of problems concerning processed foods, including internal and external corrosion of cans, tin content problems, headspace rusting, and problems concerning quality of processed fruits, vegetables, meat and fish products. He has been associated with developmental work connected with processed food cans, internal and external lacquers, and tincoating reduction. As part of field service, he has also advised widely on setting-up and equipping processed food plants and on processed food technology, quality control, sanitation procedures etc.

In 1976, Shri Dé left Metal Box to become an independent consultant and has since been advising different organisations on food processing and packaging. Among other assignments, he is now Technical Adviser to the State Fisheries Development Corporation of West Bengal.

For many years, Shri Dé has actively participated in AIFPA annual conferences, particularly in the technical sessions, contributing to the solution of problems connected with canned foods. He has been member of a number of ISI Committees and Sub-Committees dealing with food processing and packaging and continues to be a member of the Packaging Sub-Committee of the Central Committee for Food Standards, Ministry of Health. He has been a visiting lecturer to Food Technology courses at Jadavpur University.

Shri Dé is past President of the Association of Food Scientists and Technologists (India), Eastern Regional Branch, and is currently Chairman of the Plastics and Rubber Institute of U.K., Indian Section, Calcutta Centre. He has taken a leading role in organising many seminars and technical conferences, including one on Protein Fortification of Foods in 1967 and one on Mango and Its Utilization, in 1976.

He is a member of the Editorial Board of Indian Food Packer in which he has contributed articles. He is also a member of the Working Committee of the Processed Foods Export Promotion Council. Among others, he holds membership of Society of Fisheries Technologists (India) and of the Institute of Food Technologists (U.S.A.).

YEZDI AWARD

The YEZDI Award instituted this year is donated by Messrs Yezdi Distilleries, Mysore and is intended for presentation to the author of the best paper published in the 'Indian Food Packer' which has a bearing on the research and development

of new products or paper of interest to the industry. The award consists of Rs 1,000 in cash and a certificate. Shri R. Balasubramanian presented the award for the paper 'Studies on the Development of Newer Products from Mango' by A. M. Nanjundaswamy, G. Radhakrishnaiah Setty and S. Saroja, Central Food Technological Research Institute, Mysore, published in September-October 1976, Vol. XXX, No. 5 issue.

Shri A. M. Nanjundaswamy

Shri A. M. Nanjundaswamy is a research scientist working in the Fruit and Vegetable Technology Discipline of Central Food Technological Research Institute, Mysore, for the past 20 years. Born on 12th July 1932, he took his B.Sc. degree from the Mysore University in 1956 and joined CFTRI in 1957. Shri Nanjundaswamy took M.Sc. Degree in Food Technology with I Class from the University of Mysore in 1971. His research interests is in the field of Fruit and Vegetable Technology with special reference to canning, dehydration, fruit juice concentration, fruit juice powders, strained baby foods etc.

Some of the processes and products developed by him include fruit bars; strained baby foods based on mango and banana; fruit juice powders such as mango, guava and banana; a process for canning of drinking water for the Defence forces; process for concentration of orange, guava and apple juices; osmotic dehydration of fruits; thermal process evaluation for canned mango products etc. Some of them have already been exploited commercially by the industry.

Shri Nanjundaswamy along with co-authors has published 22 research papers and a number of review papers. He is also engaged in teaching and guidance work of M.Sc. (Food Tech.) students and short-term course participants. He is also serving as a member of some of the ISI committees concerned with processed fruit and vegetable products. He has been elected as the Hon. Executive Secretary of the Association of Food Scientists and Technologists of India for the year 1977.

Shri G. Radhakrishnaiah Setty

Shri G. Radhakrishnaiah Setty is working in the Fruit and Vegetable Technology Discipline of Central Food Technological Research Institute for the last 15 years. Born on 29th October 1935, he was educated

at Mysore University and took his M.Sc. degree in Food Technology with I Class in 1971.

Shri Radhakrishnaiah Setty started his work in the Central Food Technological Research Institute in the analysis of commercial fruit and vegetable products. His research interests are in the field of fruit and vegetable technology with special reference to evaluation of indigenous tinplates for their suitability for canning fruits and vegetables, fruit juice concentrates, fruit juice powders, fruit bars, osmotic dehydration of some tropical fruits, polyphenols in fruits and vegetables etc. He is also engaged in teaching M.Sc. Food Technology students and short-term course participants.

Smt. S. Saroja

Smt. S. Saroja is working in the Analytical Quality Control Laboratory of the Central Food Technological Research Institute for the last 12 years. She was born on 8th September 1939. She was educated at

Mysore University and took her bachelor degree in the year 1963.

Smt. Saroja started her career in Central Food Technological Research Institute, Mysore, in the analysis of commercial fruit and vegetable products. She is also associated with various research projects in the field of fruit and vegetable technology such as fruit bars, fruit juice powders, canning of drinking water, osmotic dehydration of fruits etc.

TECHNICAL ADVISORY COMMITTEE MEETING

The Technical Advisory Committee Meeting, convened by Lt. Col. O. P. Kapur, was held in three Technical Sessions on 25th and 26th May 1977. Representatives of the industry; can and closure manufacturers; Senior Technical Officers of the Food Inspection Organisation, Army Headquarters; as well as Army Purchase Organisation in the Department of Food, Ministry of Agriculture and Irrigation; Central and State Government Research and Development Organisations and State Trading Corporation attended the Technical Sessions.

Follow-up action on points arising out of the last Technical Advisory Committee Meeting and general problems faced by the industry were discussed during these sessions with regard to the following main issues:

(*a*) Report on the assessment of differential tinplate for canning fruit and vegetable products.

(*b*) Supply of processed food products to Defence Services.

(*c*) Implementation of Prevention of Food Adulteration (P.F.A.) Act and Rules with special reference to parameters of food products under P. F. A. Rules and analytical methods thereof.

(*d*) Export of processed food products.

Brief details of the discussion are reported in the following paragraphs:

1. *Follow-up action on points arising out of the last T.A.C. Meeting*

(*a*) *Warranty to the vendors:*

The issue of marking of expiry date on processed fruit and vegetable products was discussed in the last meeting of the Central Committee for Food Standards (C.C.F.S.) held at Mysore. As a result of technical difficulties expressed by the representatives of the food processing industry in the last Annual General Meeting held at Mysore, the implementation of marking of expiry date on Processed Fruit and Vegetable Products under Prevention of Food Adulteration Act (P.F.A.) Rules was held in abeyance by the Central Committee for Food Standards.

(*b*) *Fruit Products Order Specifications:*

45 draft specifications of processed fruit and vegetable products have been finalised by the Fruit Products Order (FPO). Redrafting Sub-committee constituted by the Central Fruit Products Advisory Committee met 4 times during last year. The main highlights of the proposed specifications are:

Name of the product	*Existing specifications*	*Proposed specifications*
Ready-to-serve (RTS) beverages	Minimum fruit juice content 10%	20% m/m
Mango juice	Minimum fruit pulp content 45%	50% m/m
Mango nectar	20%	30% m/m
Pineapple juice (standardised)	Minimum fruit ingredients 85%	95% m/m
Fruit nectars (peach, pear and guava nectars)	20%	35% m/m
Orange and pineapple nectars	40%	35% m/m
Apricot and other fruits	20%	30% m/m

(*i*) *Tomato soup:* As suggested, the addition of onion and soup flavours have been incorporated in the draft standards for tomato soup.

(*ii*) *Use of acids like acetic, malic, lactic and tartaric acids in fruit products:* The addition of acetic, malic, lactic and tartaric acids have been allowed wherever considered essential as per good manufacturing practice.

(*iii*) *Mixed chemical preservatives:* The use of combination of sulphur dioxide and sodium benzoate has been permitted in various processed food products. A combination of preservatives can also be used in squash and other fruit based beverages subject to the condition that the quantity of each preservative used in combination does not exceed the maximum prescribed limit of either preservative and the ratio may be worked out on the basis of the proportion in which such preservatives are combined.

350 ppm of sulphur dioxide=600 ppm of benzoic acid.

(*iv*) *Use of additives:* Addition of food additives is under consideration of the Food Additives Sub-Committee of the Central Committee for Food Standards (C.C.F.S.).

(*v*) The preparation of low sugar squashes, variation in oil and spices in oil pickle and vegetables in oil are also under consideration.

(*vi*) As suggested, the name of the synthetic vinegars has been changed to dilute acetic acid in the proposed draft specifications.

2. *Assessment report of differential tinplate for canning fruit and vegetable products:*

Dr M. Mahadeviah, Scientist, Central Food Technological Research Institute (CFTRI), presented a note on the results of the studies on the assessment of differential tinplate for canning fruit and vegetable products. He mentioned that observation made on cans stored at Mysore upto 12 months showed that E50 and E100 tinplate cans with all the external coating variables were satisfactory. In the case of E25 tinplate cans, only lacquered and lithographed cans were found satisfactory. More than 50 per cent of the plain and paper labelled cans showed heavy rusting. The report on the observations made at Bombay upto 12 months showed that E50 tinplate with lacquer and lithograph and E100 with all the coating variables including plain were satisfactory. E25 tinplate with any coating variables was not found suitable. He concluded that these small scale study results indicate that under Indian climatic conditions differential tinplate with one pound of tin coating inside and 0.5 lb. coating on the external surface with lacquer or lithograph can be used for canning fruit and vegetable products.

This was followed by discussions:

Shri K. R. Narasimhan of Metal Box Company of India Ltd. mentioned that the above results confirmed the results obtained by Metal Box and mentioned that SO_2 test was also conducted for these tinplates. Shri V. L. Sharda pointed out that the storage studies were conducted in the laboratory and he suggested to store the cans under factory conditions. Dr Mahadeviah pointed out that when these studies were conducted by Metal Box Company, one batch of the cans was stored in a factory at Bombay for storage studies.

Shri V. B. Oberoi wanted to know whether the storage studies of E25 (external) tinplate has been studied in foreign countries. He was informed that storage studies were only confined to Indian climatic conditions. Dr Mahadeviah brought out that imported differential tinplate with

0.25 lb. coating externally (with lacquer coating) has been supplied by some fabricators for a few canneries. Shri Daya Nand advised that such supply should be made on the basis of the findings of CFTRI to avoid complications at a later date.

A general discussion on availability of Rourkela tinplate containers and use of internally lacquered cans versus plain cans followed and many members took part in the discussion. Shri Daya Nand, Director, Fruit and Vegetable Preservation, gave details about the decision taken at Rourkela during September 1976 on the introduction of indigenous electrolytic tinplate. He pointed out that approximately 1,000 metric tonnes of indigenous tinplate has been used by the industry with no complaints so far. Shri K. R. Narasimhan insisted that the Hindustan Steel Ltd., Rourkela, should maintain a uniform quality of the tinplate suggested by CFTRI with regard to grain size structure of tin-coating. Shri N. P. Bhargava brought out that the shine and lustre of external surface in imported tinplate is better as compared to the indigenous tinplate. Shri D. D. Desai pointed out about the composition of base plate, effect of lacquering and possibility of using tin free steel for canning food products. Shri Laljeet Singh suggested to find out the possibility of using glass containers as an alternative to tinplate containers to bring about low packaging cost. Shri V. L. Sharda mentioned that tinplate with 0.25 lb. coating inside (with lacquer coating) is being used for canning vegetables. Dr Mahadeviah mentioned that normally lacquered cans affect the colour and taste of the products. Dr Naik-Kurade also pointed out about the discolouration of the product in lacquered cans. Shri K. C. Dé mentioned that tomato juice can be packed either in plain or lacquered cans. Cost of indigenous tinplate as against imported tinplate was also discussed.

3. *Supply of processed food products to Defence Services:*

The discussion was initiated by Shri N. P. Bhargava who narrated in detail as to how the fruit and vegetable processing industry was developed in the country as a result of army requirements to meet their commitments with the successive emergencies declared in 1962, 1965 and 1971, from indigenous resources. He explained the difficulties experienced by the suppliers to the Defence organisation in meeting the technical parameters of Army Service Corps (ASC) Specifications which were based on old Royal Indian Army Service Corps (RIASC) Specifications in majority of the cases. The difficulties experienced in having varietal quality control of raw materials, unstable business, grading of the processed material, fresh warranty asked for a consignment accepted on appeal by the Army Headquarters Laboratory, were narrated in detail giving an indication as to why the industry is feeling shy of meeting Defence requirements during the last year by giving priority to increasing export orders received by them to earn foreign exchange. Dr Naik-Kurade narrated in detail that the Defence demands for dehydrated fruit and vegetable products are only in the neighbourhood of 150-200 metric tons per year whereas there is enough capacity for the dehydrated units in our country to meet any increase in demands. He explained that dehydrated products have a low volume weight, easy to reconstitute under difficult terrain conditions, prolonged shelf-life when compared to canned fruit and vegetable products in brine/syrup and comparatively less costly. Thereafter, lively discussions followed where S/Shri V. L. Sharda, A. C. Batra, M. S. Gulati, O. P. Dang and other representatives of the industry narrated their difficulties with regard to the existing procedure followed by the Army Purchase Organisation and Food

Inspection Organisation with regard to their tender system, inspection, analysis and despatch thereafter of centrally purchased items of food for the Defence services. S/Shri P. K. Dhingra, R. K. Singh of the Army Purchase Organisation, and Col. R. N. Taneja of the Food Inspection Organisation, Army Headquarters, gave their view points with regard to the acceptance of sub-standard items of processed fruit and vegetable products as the need for a quality product for feeding the Defence services is the paramount necessity to ensure that the Defence forces are kept well fed and healthy in all respects. Acceptance of sub-standard items results adversely on the morale of the troops and as such they have to ensure that only quality processed food supplies reach the Defence consumer to meet their requirements, when fresh supplies are not easily available.

After considerable discussion, it was decided that there is a need for an Advisory Committee to actively assist Army Purchase Organisation and Food Inspection Organisation for ensuring quality supplies to Defence forces. This Committee will consist of representatives of Industry, FPO, I.S.I. Horticulture, DFRL, Army Purchase Organisation, Food Inspection Organisation and CFTRI so as to recommend revision to the existing procedure of inspection and despatch as well as amending Technical Army Service Corps (ASC) Specifications of foodstuffs wherever practicable so that the Defence requirements are met in full in the coming years. The Secretariat of the All India Food Preservers' Association was requested to initiate a resolution accordingly for consideration by Chief Director of Purchase, Army Purchase Organisation and Food Inspection Organisation, Army Headquarters.

4. *Implementation of Prevention of Food Adulteration Act and Rules with special reference to parameters of food products under P.F.A. Rules and analytical methods thereof:*

Shri Y. K. Kapoor initiated the discussion on the issue stating that in certain cases prosecutions have been launched under the Prevention of Food Adulteration Act where only minor deviations in analytical data arising out of the methodology employed in different analytical methods used by public analysts in our country. He suggested that there is a need that such technical issues should be dealt with by the Directorate General of Health Services (DGHS) and Secretariat of the All India Food Preservers' Association to avoid unnecessary harassment to food processing industry in facing such infringement of P.F.A. Rules on minor grounds. Shri D.S. Chadha, Secretary, Central Committee for Food Standards, explained in detail the existing procedure followed with respect to such cases involving minor deviations and indicated that suitable care is being exercised to ensure that proper guidelines are issued to all concerned in the implementation of the P.F.A. Act to avoid undue harassment to the food industry. He cautioned that the industry also must ensure that the food products manufactured by them meet the minimum requirements laid down under the P.F.A. Rules so as to safeguard consumer's interest for which the P.F.A. Act and Rules have been framed by the Government. It was also indicated that to avoid any harmful effect on health, use of coaltar food colours should primarily be not used in foods unless it cannot be avoided due to technological reasons. As such, he suggested that Food Processing Industry must take suitable measures well in advance to restrain the use of coaltar food colours to its minimum in various food products before these are completely banned from use. He pointed out that use of plastic material for processing and packaging of food pro-

ducts is not allowed unless such plastic material has been approved by the Central Government for the said purpose. After considerable discussion it was decided that any such cases of technical nature which involves intervention by the C.C.F.S. may be brought to their notice by the All India Food Preservers' Association after careful scrutiny of such representation received from the industry by a small subcommittee of technical experts.

5. Export of processed food products:

The issue was initiated by Dr Naik-Kurade who explained the various difficulties, both commercial and technical, experienced by the food processors in exporting processed fruit and vegetable products to European, East European and Gulf countries with regard to availability of raw material, tinplate, specifications and competitive prices in international market. The main difficulty was with regard to the growing importance with regard to metallic contaminants like lead and zinc in processed fruit and vegetable products. Considerable quantities of canned mango juice exported to U.S.S.R. have been rejected earlier on the plea that the sample contained lead 0.07 to 0.1 mg/litre and zinc 2.18 to 3.38 mg/litre as quality parameters laid down in the contract terms for supply of mango juice to Russian buyers stipulated that the contents of salts of lead, zinc and other heavy metals are not acceptable in the mango juice. During discussion, it transpired that such stipulation was not practicable as traces of heavy metallic constituents may be contributed to the finished product from the raw materials such as sugar, water and mango pulp used in the preparation of mango juice as well as tin solder of tin container depending upon the length and temperature during storage. S/Shri K. C. Dé and K. R. Narasimhan of Metal Box pointed out that use of internally lacquered cans with pure tin solder will definitely reduce the lead intake in the canned food products when compared to the existing plain cans being used with a tin-lead blend solder. There were conflicting views whether the lacquered cans will affect the flavour and taste of the canned products especially mango juice, but it was emphasised by Shri K. C. Dé that a certain change in flavour with use of lacquered can will result but with advantage to meet the foreign buyer's requirements. Shri Daya Nand pointed out that the FPO authorities have taken a stand that mango juice to Russia will not be supplied with stipulation of nil content in respect of salts of lead, copper and zinc. After considerable discussion it was decided that:

(*a*) supplies of fruit products, especially mango juice, will not be agreed for export with limits of lead and zinc contents being zero, as even the Codex Alimentarius Commission Report of the 10th Session of Codex Committee on Food Additives has indicated permissible limits of metallic contaminants for lead and zinc in mango juice and other fruit products;

(*b*) to request FPO authorities to take up with the Russian Government to accept mango juice according to the Codex Alimentarius Standards; and

(*c*) to request S.T.C. to invite their counterpart in Russia for sending a technical delegation to our country so that they can visit the various processing factories where food products for export are being manufactured and also to have technical discussion with a view to agree for supply of mango products in accordance with the International Codex Standards in the coming years.

The Secretariat of the All India Food Preservers' Association was requested to formulate a resolution on the above lines for submission to the Department of Food, Ministry of Agriculture and Irrigation, as well as to S.T.C. for taking further suitable

action so that the supplies of mango products for which contracts have not been entered this year with Russia may be formulated in advance for the next years to meet the existing capacity available in the food processing industry.

Business Session

The Business Session was held in Raja Room on 26th May 1977. Shri V. L. Sharda was in the chair. Shri Y. K. Kapoor presented the report for the year 1976, which was adopted unanimously. The following were elected to the executive committee for the year 1977:

President—Shri Kisan Mehta (Coca-Cola Export Corporation, New Delhi)

Vice-President—Shri V. L. Sharda (Tims Products Ltd., Calcutta)

Chairman, Executive Committee—Dr A. G. Naik-Kurade (Suman Food Consultants, New Delhi)

Hony. Secretary—Shri Y. K. Kapoor (Northland Industries, New Delhi)

Members

Northern Zone: N. P. Bhargava—The Midland Fruit and Vegetable Products (India) Pvt. Ltd., New Delhi

D. S. Rathor—National Agricultural Co-operative Marketing Federation Ltd., New Delhi

Southern Zone: T. G. Mathew—Bolsts Indian Condiments Pvt. Ltd., Bangalore

M. I. David—The Canning Industries Cochin Ltd., Trichur

Eastern Zone: A. N. Mitra—Mida and Co. Pvt. Ltd., Calcutta

Rajkumar Sharma—Fruto's and Co., Gauhati

Western Zone: M. A. Tejani—Gits Food Products (India), Poona

Ashok K. Bhiwapurkar—B'kar Products, Nagpur

Co-opted Members:

Rakesh Jindal—Excelsior Food and Chemical Industries, New Delhi

P. D. Katrak—Zenith Tin Works Pvt. Ltd., Bombay

S. R. Palekar—Corn Products Co. (India) Pvt. Ltd., Bombay

A. C. Batra—Maharashtra Agro-Industries Dev. Corpn. Ltd., NOGA Factory, Nagpur

Permanent Invitees

1. Bahri B. R. Malhotra, Managing Director, Weikfield Product Co. (India), Poona

2. Dr J. Contractor, Coca-Cola Export Corporation, New Delhi

3. Director, Central Food Technological Research Institute, Mysore

4. Director (F and VP), Dept. of Food, Ministry of Agriculture and Irrigation, Krishi Bhavan, New Delhi

5. Secretary, Central Committee for Food Standards, Ministry of Health, New Delhi

6. Secretary, Processed Foods Export Promotion Council, Barakhamba Road, New Delhi

7. The Metal Box Co. of India Ltd., Calcutta

8. Shri M. S. Kohli, Kissan Products Ltd., Bhojeepura, Bareilly

9. Shri B. S. Bahri, Food Kings, New Rohtak Road, New Delhi.

10. Shri K. C. Dé, 2 Gokhale Road, Calcutta

11. Shri P. C. Stokes, Himprocess, Jabli, Dist. Solan, Himachal Pradesh

Editor, Indian Food Packer: V. B. Oberoi, Kissan Products Ltd., Bangalore

Convener, Technical Advisory Committee: Lt. Col. O. P. Kapur, Central Food Technological Research Institute, Mysore.

The following sub-committees were formed:

(*i*) To suggest changes in the Constitution:

V. L. Sharda—Vice-President: Tims Products Ltd., Calcutta

N. P. Bhargava: The Midland Fruit and Vegetable Products (India) Pvt. Ltd., New Delhi

V. B. Oberoi: Kissan Products Ltd., Bangalore

(*ii*) To deal with Prevention of Food Adulteration Act:

Bahri B. R. Malhotra: Weikfield Products Co. (India), Poona

Shri A. C. Batra: The Maharashtra Agro-Industries Development Corpn., NOGA, Nagpur

Shri Y. K. Kapoor, Hony. Secy: (Coordinator).

Raylon Award

Shri V. B. Oberoi suggested that efforts should be made for selection of best entry so that the award which has been lying dormant for a long time could be given at the next Annual General Meeting to be held during April/May 1978. The following sub-committee was formed to evaluate the innovations in machinery and equipment for fruit and vegetable industry:

P. K. Ramanathan	(Chairman)
Lt. Col. O. P. Kapur	(Member)
E. A. Raylon	(Member)
Daya Nand	(Member)
V. B. Oberoi	(Convener)

RESOLUTION NO. I

Packaged Commodities (Regulation) Order, 1975

The All India Food Preservers' Association discussed the various provisions of the Packaged Commodities (Regulation) Order, 1975, and noted that this Order was a measure of Government's concern to protect the consumers' interest. It noted that the provision for the declaration of the maximum retail selling price was proving detrimental to the interest of consumers as the maximum retail selling price of most processed foods, leaving aside a few national brands, tends to be declared on the higher side. The retail vendor has a convenient excuse for charging higher profits. On the other hand, at certain places which act as distribution centres for far flung places like Andaman, Sikkim, Assam etc., the maximum retail selling price as declared by the manufacturer becomes unremunerative to the retail vendor on account of jacking up of the cost of the wholesaler by railway freight, town/octroi duty and distributor's profit. When the goods are re-booked to the retail vendor's station, he finds nominal or negative profit if he sells goods at the declared maximum retail selling price. The absence of profit to the ultimate retail vendor acts as a disincentive to the development of trade causing shortages of processed foods in these far flung places.

In view of the above, the All India Food Preservers' Association resolves to recommend to the Government to amend clause 3 (*iv*) of the said Order and absolve the manufacturers of their responsibility to declare the maximum retail selling price of packaged and processed foods. Instead, the retailers may be made to declare the maximum retail selling price keeping in view the landed cost of procurement.

RESOLUTION NO. II

Constitution of a broad-based Advisory Committee to actively assist the Army Purchase Organisation and Food Inspection Organisation for ensuring supplies to the Defence

Services and minimising hardships to the suppliers.

The All India Food Preservers' Association discussed the problems of the Industry faced in supply of processed food products for Defence services. It took cognisance of the reference made in the Inaugural Address by the Chief Guest, Shri R. Balasubramanian, Secretary, Department of Food, Ministry of Agriculture, New Delhi, that there is a shortfall of about 3-4 thousand tonnes of processed fruit and vegetable products for the Defence services during the last year as the Defence suppliers did not come forward to offer supplies to the Army Purchase Organisation.

Representatives of the Industry highlighted their hardships with regard to the commercial and technical procedural difficulties involving inspection, analysis and despatch thereafter of consignments conforming to the relevant Army Specifications. Procurement difficulties on varietal control of raw materials, tender system, unstable nature of supply orders, grading requirements of processed materials, fresh warranty asked for when consignments are accepted on appeal etc., were discussed threadbare by all concerned. After considerable discussion wherein representatives of Army Purchase Organisation and Food Inspection Organisation took part:

It was resolved that a broad-based Advisory Committee in place of the existing CDP Advisory Committee be constituted to actively assist the Army Purchase Organisation and Food Inspection Organisation for ensuring supplies to the Defence services and minimising hardships to the suppliers. This Committee may include the representatives of Industry, the Director (F and VP), I.S.I., Department of Horticulture, Defence Food Research Laboratory, Army Purchase Organisation, Food Inspection Organisation and the CFTRI, so as to recommend revision wherever necessary of the existing procedures of inspection and despatch as well as Technical Army Service Corps Specifications of processed foodstuffs so that avoidable hardships of the Industry are removed and the Defence requirements of processed foodstuffs are met in full. The All India Food Preservers' Association further resolves that the above Advisory Committee, after being constituted as suggested above, may meet early, say within three months, to identify the issues involved.

RESOLUTION NO. III

Prevention of Food Adulteration Act and Rules

The All India Food Preservers' Association has collected data regarding samples found non-conforming by P.F.A. authorities from all over the country.

These samples have been rejected on minor grounds like low acidity, low total soluble solids, mislabelling like 'Karela in brine' labelled as 'Baked Beans in Tomato Sauce' etc. None of the rejected samples were found to be unfit for human consumption or had health hazards.

In view of the above, the All India Food Preservers' Association strongly recommends to the Government that all products bearing FPO Mark should be exempted from the operation of P.F.A. Act and Rules as the same are checked from time to time at the Central Food Technological Research Institute which has now been recognised as Central Food Laboratory, Southern Region, under P.F.A. Act and Rules.

RESOLUTION NO. IV

Lead and Zinc Content in Mango Juice For Export to Russia

The All India Food Preservers' Association reviewed the latest position of export of

Mango Juice to U.S.S.R. It has not been possible to finalise a contract of export with Russia as they had insisted on zero ppm of lead and zinc content in Mango Juice and they had been using atomic absorption spectrophotometer for the detection of lead and zinc. The Association was of the view that the Government may approach U.S.S.R. again to accept analysis by AOAC (Chemical) methods for detection of lead and zinc in Mango Juice.

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UTILIZATION OF UNCONVENTIONAL FRUITS FOR THE PREPARATION OF READY-TO-DRINK BEVERAGES—PART I.

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Abstract

Unconventional fruits such as Woodapple, Chakota, Casew apple, Kamardrakshi, Hebbalasu, Punarpuli, Jamnerale, Yelachi and Passion fruits were selected for the preparation of beverages. Artificial colours and flavours were added for selected fruit juices for enhanced acceptability. Eighty-nine samples were tested for beverage value by sensory evaluation. Results of the data showed that cashew apple, passion fruit, hebbalasu, kobrikayi, yelachi, punarpuli pulp and wood apple juices were scored desirable with and without artificial flavouring agents among the total number of juices studied. Pineapple, cardamom flavours were most frequently liked artificial flavours with juices. Study indicated many of the little known fruits could yield very desirable fruit juices. Cultivation and protection of these plants and trees are desirable. A few of the artificial colours and flavours could add interest and variety to the consumer.

Introduction

Fruits and fruit products are essential part of daily diet. This part of the diet is highly neglected in our country. Dietary and nutritional surveys have shown that consumption of fruits is almost nil in Karnataka State and that people in India are suffering from vitamin C and A deficiency, besides minerals such as iron and calcium (Aykroyd, 1970). If we make use of several of our tropical fruits which are heavy yielding varieties, we may overcome this problem of deficiencies that arise because of lack of fruits and vegetables in our diets. Consumption of fruit juices is very much limited in India (Raghuramaiah and Ranganna, 1970). There are quite a few varieties of fruits whose yield per plant or tree is heavy, acidic and juicy and suitable for production of beverages but they are not popularly or traditionally used (Marigowda, 1974). It would be very useful, if these unconventional fruits are studied for their beverage value and used for the manufacture of acceptable fruit drinks, for consumption.

Jain and Borker (1970) have prepared ready-to-serve beverage from guava fruit (*Psidium guajava*). Results showed that it has high pulp and addition of vitamin C improved the flavour. Typical composition, processing and marketing studies were performed on passion fruit by Whittaker (1973). West Indian cherry products including squash, jam, jelly and clarified juice were

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studied by Muthukrishnan and Palaniswamy (1972). *Cucumis melo var. memordica* was used by Nalwadi (1970) for the preparation of musk melon flavoured ready-to-serve beverage and showed that the fruits have been sold at low price and indicated 4 to 5 months of shelf-life. Cashew apple preparations including juice, wine and jam etc., were reported in the cashew journal of 1966. It is important that whether a new food or beverage is acceptable or not is investigated before introduction to open market. Hence, the objective of this study was to find out which of the selected unconventional fruits would be suitable for beverage production and identify those preparations which are desirable in their quality characteristics and overall acceptability. Fruits selected for this study were: (1) wood apple (*Feronia elephantum*), (2) Pomello (*Citrus maxima*), (3) Hebbalasu or Peje (*Artocarpus hirsuta*), (4) Cashew apple (*Anacardium occidentale*), (5) Kokum or Punarpuli or Brindoa (*Garcinia purpurea*), (6) Passion fruit or Kadamba (*Passiflora edulis*), (7) Jujube or Yelachi (*Zizyphus jujuba*), (8) *Eugenia jambolona*, or Jamnerale (*Syzigium jambolanum*) and (9) Kamarak or Kobrikayi or Kamardrakshi (*Averrhoa carambola*).

Materials and Methods

Fruits were collected at their respective seasons and storage method for these fruits varied because of existing facilities not permitting uniform method. Method of storage adopted for each prepared fruit juice is given below.

1. *Wood apple*

Fruits were purchased from the City Market, Bangalore. They were deshelled by hand and the pulp with seeds were mixed with required quantity of water and boiled twice, for two extractions from pulp. Brix was raised to 13° by addition of sugar from its original 7°. The prepared juice after boiling for 30 minutes was filled into cans, while it was still hot, by using stainless steel laddle. Then the cans were sealed by a hand machine and sterilized in boiling water bath for 30 minutes, cooled and stored at room temperature.*

2. *Chakota*

Fruits were purchased from City Market wholesale dealers in Bangalore. They were peeled with the help of steel knife and fruit segments, with least possible albedo, were boiled with water and strained through strainer (0.1 mm mesh). Potassium metabisulphite as per Fruit Product Order (FPO) specification was added, bottled and crown corked.

3. *Hebbalasu*

Fruits were purchased at Mangalore market. The skin of the fruits was removed, and deseeded pulp was obtained with the addition of required amount of water. The pulp was heated to 80°C and canned.

4 and 5. *Punarpuli pulp and skin*

Fruits were brought from Mangalore market. They were washed, skin separated, and oven dried at 80° for 3 days and stored in polythene bags at room temperature. The pulp was deseeded and canned separately.

6. *Cashew apple*

Apples were collected from Cashew Research Centre, Ullal, Mangalore. They were washed, pulped, and strained through muslin cloth. Required quantity of 0.05 per cent gelatin to precipitate the astringent principles was added. This was frequently

* Community Canning Centre, Govt. of India, Bangalore-560 040

stirred and kept in cold storage stirred for three hours. Then juice was decanted and canned.

For canning of Hebbalasu and Punarpuli pulp, the fruits were deseeded with the addition of water and by passing through the pulping machine. The pulpy juice was heated to 80°C and filled to 1 lb. jam size acid resistant cans, leaving 1 inch gap at the top. The cans were then mechanically vacuum sealed. For the cashew juice, after decantation, it was not subjected to 80°C heating and rest of the procedure was the same. The sealed cans were sterilized in near 100°C water bath for 30 minutes and cooled in running water, then wiped dry and stored at room temperature.

7. *Jamnerale*

Fruits were purchased from City Market, Bangalore; they were washed, wiped with clean cloth and put in polythene bags and stored in deep freeze.

8. *Kobrikayi*

Sour variety of fruits were purchased from Lalbagh Horticultural Society, Bangalore. They were washed, weighed and put in polythene bag, sealed and stored in deep freeze.

Punarpuli skin was put in boiling water for 7 minutes and filtered through a sieve (0.75 mm mesh) and clear prepared juice was mixed with 1 per cent citric acid and 0.05 per cent salt before preparation of ready-to-serve drink. Also, Jamnerale was thawed from frozen stage to room temperature and put into boiling water for 3 minutes. It was strained through 0.05 mm mesh sieve and 1 per cent citric acid was added while warm, with 0.05 per cent salt to improve the taste. Kobrikayi are thawed, cut into halves, seeds removed and juice was hand squeezed from the fruit and passed through the muslin cloth. Sodium metabisulphite was added as permitted by FPO specifications.

9. *Passion fruit*

Fruits were collected from the residents of Hindustan Machine Tools Colony. They were cut into halves, pulp was scooped and blended with water in a waring blender for 30 seconds and filtered in 0.5 mm mesh sieve and this thick juice was put into polythene bags, sealed, and kept in deep freeze at—5°C.

10. *Yelachi*

Fruits were purchased from City Market, Bangalore. They were washed, autoclaved for 5 minutes at 10 lb. pressure, then deseeded and boiled for 30 minutes. While warm, citric acid was added, and while cold, sodium benzoate was added to the standard specifications of FPO. The extracted juice was filled to sterilized bottles and crown corked.

All the essences and colours were bought from Janatha Bazar and Nilgiri Dairy, Bangalore. Essences and colours were from the following manufacturing companies—Aromatic Chemicals and Oils Co., Viola; Modi and Co., Bombay-2, and Sunkist National Flavour Industries, Nasik. For the 500 ml ready-to-serve formula, 0.1 to 0.3 ml of essence and/or 0.1 ml of colour were added.

Sugar syrup of 70° brix was prepared based on the method of Dastur (1973) with no addition of essence or colour. The syrup was kept ready. It was mixed to the formula of each type of prepared juice together with water for the dilution as desired in a beverage. Then flavour and colour were added wherever necessary. In a preliminary study, various ingredients were also tested for quantity to be added in ready-to-serve formulae. Those essences and colours felt unsuitable for experiment were omitted. There were 89 samples for

the experiment with 17 essences and artificial colours besides those of natural flavours and colours. Samples were coded from A to J for natural juices and their respective juices were subscribed with numbers when artificial essences and colours were added. E.g., A=wood apple, A_1=wood apple juice with rose flavour.

The storage duration of fruits or of the prepared juices before dilution for the final formulae of the ready-to-serve beverages was recorded. The prepared juices were mixed with water, sugar syrup, colour or essence and stirred well by glass rods and served to the members of the sensory evaluation as ready-to-drink beverages. Individual fruit weight, cost per kg, percentage of wastage and yield were calculated. Total soluble solids, percentage of acidity, pH value, and sedimentation value were determined for the natural fruit juices (N) according to Jain and Borker (1970).

Sensory evaluation: Fruit drinks in their natural form (N) and also mixed with the selected colours and flavours to the total of 89 samples were served to nine judges. Eight samples of 15 ml each per day were given to the judges in three sessions per week for sensory evaluation. Along with the samples, score sheets were provided to record the scores. The scoring scale was: (1) highly undesirable, (2) undesirable, (3) slightly undesirable, (4) acceptable, (5) slightly desirable, (6) desirable and (7) highly desirable. Characteristics studied were: (*a*) appearance, (*b*) flavour, (*c*) consistency and (*d*) overall acceptability.

Statistical analyses: The scores of 89 samples were subjected to statistical analysis, applying the Kruskar and Wallis 'H' test criterion, to test the hypotheses of no difference between the samples (Steel and Torrie, 1960). Multiple regression equation was fitted to the data to explain the relationships between the dependent variable overall acceptability, with the three independent variables viz. colour, flavour and consistency. In order to measure the extent to which variation in the dependent variable is associated with the variation in the three independent variables, coefficient of multiple correlation was computed. The closeness of association between the overall acceptability with each of the three independent variables, after the effect of other variables have been removed, was estimated by calculating partial correlation coefficients and also beta coefficients which reduce the net regression coefficients on a comparable basis (Ezekiel and Fox, 1963).

Results and Discussion

Observed storage duration of the fruits, the fruits and prepared juices of the study were stored for 9 months to 1½ years under the conditions mentioned without spoilage. Specially cashew, hebbalasu, punarpuli pulp and wood apple juice can stay as long as 1½ years, chakota juice, dried punarpuli skin for 2 years, yelachi for 9 to 10 months, kobrikayi and passion fruit juice after 6 months. Jamnerale lost most of its original colour and flavour for 6 months. Taking the cost factor into consideration, yelachi, punarpuli and kobrikayi were cheaper. Largest percentage of edible portion was obtained from punarpuli skin, chakota and kobrikayi. Highest yield of beverage was obtained from yelachi, chakota, wood apple and jamnerale (Tables 1 and 2). Table 3 gives pH, acidity, sedimentation percentages and brix of fruit juice and also of beverage. With respect to all the four characteristics, Kruskar and Wallis test criterion 'H' as highly significant and hence the null hypotheses that all the 89 samples came from the same population was rejected. The taste panel had found marked differences with respect to some of the samples tested. Hence based on the average scores, the samples are

TABLE 1. *Seasons available, storage duration, weight of individual fruit and cost of fruit studied*

Name of the fruit	Season available	Storage duration in months†	Weight/fruit (g)	Cost/100 fruits or kg
1. Wood apple	January-May	12	350	Rs. 21 per 100
2. Chakota	January-March	12	800	Rs. 90 per 100
3. Hebbalasu	May-July	6	250	Rs. 14 per 100
4. Cashew apple	March-May	6	50	Obtained free from Cashew Res. Station, Ullal.
5. Punarpuli pulp	August-October	6	18	Rs. 1-50 per 100
6. Punarpuli skin	April-June			
7. Passion fruit	May-June September-October	3	50	Collected from the HMT Residential Colony.
8. Yelachi	January-March	12	2.1	Re. 1 per kg
9. Jamnerale	June-August	6	8.0	Rs 1-50 per kg
10. Kobrikayi	May-July	3	65.0	Rs. 12 per 100

† Period kept under storage before serving to the taste panel and in various storage conditions detailed in the text.

TABLE 2. *Utilitarian factors of the fruits used for the beverages*

Name of the fruit	Edible portion %	Waste %	Water ratio for juice prepared	Ready-to-serve drink formula			Ready-to-serve drink from fruits (%)
				Juice conc.	Water in g	Sugar syrup	
1. Wood apple	43.0	57.0	1:2.0	110	225	32.5	431.3
2. Chakota	53.0	47.0	1:2.0	100	225	123.5	914.8
3. Hebbalasu	36.0	64.0	1:1.5	100	225	32.5	201.9
4. Cashew	34.5	65.5	1:3.2	100	130	32.5	179.8
5. Punarpuli pulp	27.6	17.1	1:0.44	100	150	65.0	97.3
6. Punarpuli skin*	87.6	12.4	1:9	100	100	58.8	245.0
7. Passion fruit	36.0	64.0	1:1	100	200	65.0	150.6
8. Yelachi	28.0	72.0	1:28	100	250	84.5	1278.2
9. Jamnerale	32.5	67.5	1:0.75	100	50	19.5	303.7
10. Kobrikayi	51.3	48.7	1:0	100	50	52.0	135.8

*55.3 per cent skin from Punarpuli fruit.

arranged in order of desirability. Table 4 shows the first 20 ready-to-serve beverages liked by the taste panel in order. The salient features are discussed below.

Appearance: Little known fruit in beverage industries, i.e., yelachi ranked highest in the score for appearance. Chakota with cochineal red, punnarpuli skin, passion fruit, hebbalasu, jamnerale, kobrikayi and cashew were in order of preference as seen in Table 4. Chakota with cochineal red scored higher than chakota with lemon yellow colour. The reddish brown colour of yelachi though scored high for appearance

TABLE 3. *Physico-chemical characteristics of the fruit beverages*

Name of the fruit	Fruit juice prepared		Ready-to-serve beverages			Sedimentation (%) (of the beverage)
	°Brix	pH	Total acidity%	pH	°Brix	
1. Wood apple	6.5	3.9	0.5	4.3	10	24.9
2. Chakota	9.0	2.7	0.4	4.8	16	11.5 (Suspension 19.2%)
3. Hebbalasu	12.0	4.0	0.5	5.0	12	1.7
4. Cashew	12.0	4.5	0.14	5.8	12	Nil
5. Punarpuli pulp	10.0	2.6	0.4	4.0	13	7.8 (Suspension 3.5%)
6. Punarpuli skin	5.0	2.4	1.2	3.7	13	0.04
7. Passion fruit	6.0	3.5	0.7	4.2	14	0.5
8. Yelachi	7.0	3.4	0.55	4.1	15	5.2
9. Jamnerale	4.3	4.3	0.5	4.4	10	10.0
10. Kobrikayi	4.0	2.7	0.4	3.0	20	0.5

could be seen at 5th place in overall acceptability. Light brown, pink, reddish orange, yellow orange colours obtained higher scores for appearance. Appearance of a beverage had lesser influence than flavour on overall acceptability.

Flavour: Cashew plain (N), and pineapple, raspberry, cardamom flavoured juices were scored high for flavour. Yelachi with pineapple flavour, kobrikayi with pineapple, passion fruit (N) and with pineapple and cardamom, hebbalasu with pineapple and cardamom were found to be at the top of the list of 20 juices which were scored high.

Consistency: Passion fruit juice (N) and its 5 artificially flavoured beverages topped the list of the highest scored juices in consistency and similarly cashew, hebbalasu, passion fruit, wood apple and punarpuli pulp in order. It appeared that once the original beverage consistency was scored at particular level, addition of artificial flavours did not much affect the scores.

Overall acceptability: Cashew apple drink (N) and three of the synthetic essences for it, namely, pineapple, raspberry and cardamom; passion fruit (N) and two essences, hebbalasu with cardamom and yelachi were a few that were scored as highly desirable. For cashew, passion fruit hebbalasu, there was not very big differences in scores with all the judged characteristics.

A citrus fruit like chakota which yields very good amount of fruit juice and very appealing to the eye had been rated low as individual fruit juice for acceptability. This might be because of its bitter taste, that is due to flavonone, naringin and limonin. The bitter principles were mainly because of the retention of albedo, and outer membranes of the juice sacks in chakota fruit juice. Since the yield of the chakota fruit juice is highest among all tested, further study on this fruit juice is worth undertaking.

The multiple regression equation fitted to the data was as follows:

$$y=35.43=0.33\ x_1+1.25\ x_2+1.01\ x_3$$

where y denotes overall acceptability, x_1 denotes colour, x_2 denotes flavour and x_3 denotes consistency.

This indicated that for every unit increase in (1) colour, (2) flavour and (3) consistency, overall acceptability was increased by 0.33, 1.25 and 1.01 units respectively. Contribution of flavour to overall acceptability was at a higher rate (1.25) when compared with the other two characteristics. This may

TABLE 4. *Fruit beverages which ranked high in order of preference for the attributes studied*

Rank in order of preference	Attributes			
	Appearance	Flavour*	Consistency	Overall acceptability
1.	Yelachi	Cashew (N)* and with Pineapple, Raspberry, Cardamom	Passion fruit (N) and with Orange, Rose, Mango, Pineapple, Peppermint, Cashew (N) and with Pineapple, Yelachi+Rose	Cashew (N) and with Pineapple, Raspberry, Cardamom
2.	Chakota+Cochineal red	Yelachi+Pineapple, Cardamom	Hebbalasu+Cardamom	Passion Fruit+Pineapple, Cardamom.
3.	Punarpuli skin	Kobrikayi+Pineapple	Cashew+Raspberry Yelachi+Cardamom	Hebbalasu+Cardamom
4.	Passion fruit (N) and with Peppermint Hebbalasu+Pineapple	Passion Fruit (N) and with Pineapple, Cardamom	Passion fruit + Vanilla, Yelachi (N) and with Vanilla, lavancha, Orange, sogadéberu, Hebbalasu+Pineapple	Passion fruit (N)
5.	Hebbalasu+ Cardamom	Hebbalasu+ Pineapple, Cardamom and Mango	Wood apple+ Rose, Punarpuli pulp+ Cardamom, Pineapple	Yelachi (N)
6.	Jamnerale+ Menthol, Rose, Mango, Pineapple	Yelachi+ Cardamom	Cashew+ ginger, Wood apple (N) with Pineapple, Orange	Punarpuli pulp+Pineapple.
7.	Punarpuli pulp	Punarpuli pulp+Pineapple	Hebbalasu+ ginger, Wood apple+Raspberry	Yelachi+Pineapple
8.	Chakota+ lemon yellow†	‡Woodapple+ Pineapple	Punarpuli+ Rose	Hebbalasu+ Raspberry, Pineapple
9.	Hebbalasu (N) and with Raspberry	Yelachi+Rose	Hebbalasu+Raspberry	Kobrikayi+Pineapple.
10.	Cashew apple+Cochineal	P. Pulp+Cardamom P. skin+Pineapple	Cashew+sogadéberu	Yelachi+Cardamom
11.	P. pulp+Menthol	Hebbalasu+Raspberry	Kobrikayi+Menthol	Hebbalasu+Mango, Passion fruit+Rose
12.	Kobrikayi, P. pulp +Rose	Wood apple+Rose, Vanilla	Jamnerale+Pineapple	Wood apple+Orange, Pineapple +P. pulp +Cardamom
13.	Cashew apple+lemon yellow, Cashew (N)	Jamnerale+Cardamom	Punarpuli skin	Cashew+ginger, Orange; passion fruit +Orange
14.	‡Chakota	Hebbalasu+Rose	Kobrikayi+Pineapple	Wood apple+Rose
15.	Wood apple (N) and with Raspberry, Cardamom, Pineapple	Passion fruit+Rose	P. skin+Pineapple	Hebbalasu+Vanilla
16.	Hebbalasu+Vanilla	Hebbalasu+Vanilla, Mango	P. pulp+orange, P. skin+orange, Jamnerale+cardamom Kobrikayi+Rose, Vanilla	Jamnerale+Cardamom
17.	‡Wood apple	Jamnerale+Pineapple	P. pulp+Menthol	Woodapple (N) and with Raspberry, Vanilla‡
18.	Cashew+lemon yellow+Menthol	Passion fruit+Orange	P. skin+Vanilla	Passion fruit+Mango
19.	Wood apple+Vanilla	Cashew+ginger	Jamnerale+Rose	Jamnerale+Vanilla
20.	Chakota (N)	Jamnerale (N)	P. skin+Menthol, P. skin+Rose	Passion fruit+Vanilla Kobrikayi (N)

(N)*=Natural flavour of the fruit and rest of them are synthetic flavour added.

†=Artificial colour ‡for 1 minute in waring blender blended.

be seen in the Table 4 showing the combination of the juices with the synthetic essences. Next characteristic in order which contributed to overall acceptability was consistency. The multiple correlation coefficient r= 0.904 which was highly significant showed that ninety per cent of the variation in the overall acceptability was explained by the characteristics taken into consideration. The values of partial correlation coefficient and the beta coefficients showed that the rank of the three variables was the same for both the coefficients indicating the closeness of association with overall acceptability.

Independent variable	Variables held constant	Coefficient of partial correlation	Beta Coefficient
Colour	Flavour and consistency	0.19	0.21
Flavour	Colour and consistency	0.69	0.72
Consistency	Colour and flavour	0.41	0.37

It was shown that fruits with natural flavours rated high except for wood apple which lost its score for consistency and resulted in less desirable acceptability by the panel (it was fibrous and had high sediment). Pineapple and cardamom were highly scored flavours which were among essences, accepted most frequently. Cashew juice with natural and artificial flavours when compared with a varied number of unconventional fruit juices become the best drink for acceptability.

Nutritionaly passion fruit is a rich source of carotene 1968 μg, ascorbic acid 13 mg and riboflavin 0.2 mg; wood apple has protein 7.1 g, fat 2.1 g, minerals 1.9 g, and 134 calories per 100 g of edible portion. Ascorbic acid content of cashew, yelachi and chakota ranges from 180, 76, and 20 mg per cent respectively. Similarly other fruits also have good nutritional value (Gopalan *et al.*, 1976 and FAO. 1973).

Nadkarni in *Indian Materia Medica* (1954) enumerates medicinal uses for the fruits of this study. Therapeutic value ranges from heart and liver disease to simple biliousness and diarrhoea prevention and cure.

In today's super market, innumerable food products appear. Beverages are the easiest new products for introduction. As commercialization is one of the main objectives of this experiment, the manufacturers of fruit juices could benefit by production of these juices besides increasing food value for consumers.

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UTILIZATION OF UNCONVENTIONAL FRUITS FOR THE PREPARATION OF READY-TO-DRINK PUNCHES—PART II.

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Abstract

Cultivation of new fruits, production of fruit beverages from many of the non-table fruits could bring benefit nutritionally and economically. Ten varieties of semi-wild and wild fruits were used in the preparation of 62 selected type of fruit punches. Five different fruit drinks were prepared for each type of punch and mixed in equal volumes. Sensory evaluation was conducted to evaluate all the fruit punches for appearance, flavour, consistency and overall acceptability. Data collected were statistically analysed to arrive at those punches which were scored highest to lowest of the scale and to test how much of these characteristics have influence on the overall acceptability of a blended punch. Top twenty fruit punches in respect of all attributes tested have been listed. Contribution of flavour, appearance and consistency to the overall acceptability is explained to the extent of 91.5 per cent. Commercial production of these punches is desirable as these fruits are cheaper and nutritious too.

Introduction

Fruit cocktail mixes must have been familiar to India as the word 'punch' itself comes from Sanskrit, meaning 'five', and American dictionary says as combination of five fruits with flavour and mild alcoholic content (Morris, 1969). Beverages contribute greatly to quench the thirst of man in tropical countries though it could greatly add to the nutrition of his total dietary intake if regularly taken as a part of meal, which is hardly practised in India (Aykroyd, 1970). Even very little availability of fruit beverages for regular intake noticed might be because of scarcity of the traditional fruits and high cost of the fruit juices for a common man's reach. In a country with a wide variety of fruit bearing trees (Hayes, 1960), we can increase the production of beverages by introducing new variety of fruits that could be used for the preparation of interesting types of beverages. It would improve the health of the consumers (Raghuramaiah and Ranganna, 1970). Food product development is as much important as nutritional studies. For proper utilization of the food material available in the country, necessary study for utilization of any product should be conducted. If not, nutrients available in them cannot be utilized nor any fortification possibilities could be studied further. Hence, certain varieties of fruits that are grown in plenty specially acidic and rich in certain nutrients and highly juicy but have certain drawbacks which require modification in processing and preparation methods have been picked up for the be-

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verage preparations in this study. These fruits have not been well accepted as fruits for eating at the dinner table. Food habits of human beings are hard to change, especially when unconventional ingredients are used in food items (Lowenberg, 1970). Hence, one has to study how much acceptable these fruit beverages are for consumers, by sensory evaluation of the quality characteristics and overall acceptability.

'Fruit culture in India', a compilation of the fruits cultivable in India (Singh *et al.*, 1967), indicates fruits for beverage manufacturing purposes and there are far too many fruits which are still to be exploited for food value. Girdhari Lal *et al.* (1957) and Cruess (1958) have given a long list of such fruits too. Muthukrishnan and Palaniswamy (1972) have studied various products of Barbados cherry including clarified juice and their blended squash with pineapple and lime. Nalawadi (1970) prepared ready-to-serve beverage from a new fruit called *Cucumis melon var momordica* and showed possibility of utilization of these unconventional fruits for beverage purposes. According to Raghuramaiah and Ranganna (1970), blended citrus fruit juices of equal volumes have been commercially packed in Florida as early as in 1935-36 and today there are many blended, diluted fruit juice drinks introduced in the market. Most of them have proved popular, especially those that have citrus juice in them.

In this study, purpose of blending selected fruits as a punch was to combine qualities of the individual fruits with one another and find out possible utility for semi-wild and wild type of fruits and to investigate possible number of acceptable blended fruit juices from the given combination of five fruits out of the total ten varieties tested, and to determine which of the specific punch combinations could get high scores in the sensory evaluation and overall acceptability.

Fruits selected for the study were:

1. Wood apple (*Feronia elephantum*)
2. Kamardrakshi (*Averrhoa carambola*)
3. Chakota or Pomello (*Citrus maxima*)
4. Ber or Yelachi or Jujube (*Zizyphus jujuba*)
5. Passion fruit or Kadamba (*Passiflora edulis*)
6. Punarpuli skin, Kokum, Brindoa (*Garcinia purpurea*)
7. Punarpuli pulp, Kokum, Brindoa
8. Cashew apple (*Anacardium occidentale*)
9. Jamoon or Jamnerale or *Eugenia jambolana* (*Syzigium jambolanum*)
10. Hebbalasu or Peje (*Artocarpus hirsuta*)

In the Part I of this paper, individual fruits were studied for the preparation and acceptability of fruit drinks with the natural flavour and colour and by addition of synthetic essences and colours.

Materials and Methods

In the study on unconventional fruits for beverages, details about collection of fruits, their storage and preparation of individual fruit drink are given. All possible combinations of five out of ten fruit drinks were prepared and tested by mixing each drink in equal volume for each punch. Thus, there were a total of 252 (10 C_5) samples of punches. By means of a pilot study this large number of combinations were reduced to 62 for the sensory evaluation study. Other combinations had either too unpleasant colour, very sour, bitter or flat flavours where chances of rejection were more than for acceptance of the drink by the panel of judges. Fruit punches were served to a well instructed taste panel consisting of ten judges. Glass juice cups which could be filled to half of the level by 15 ml of juice were used.

Sensory evaluation

Panel was asked to score the fruit punches for the appearance, flavour, consistency and overall acceptability after tasting the samples. They were requested to select any of the score point from 1 to 7 which best described their feeling, and they were encouraged to give their comments, if any, on any of the punches evaluated by them. Score (1) was lowest, meaning highly undesirable, (2) undesirable, (3) slightly undesirable, (4) acceptable, (5) slightly desirable, (6) desirable and (7) highly desirable. Panel was given 8 samples at a time and one of the sets served was given $1\frac{1}{2}$ minutes medium speed mechanical blending by means of using a waring blender to find out the effect of blending on the punches' characteristics and scoring difference, if any. The panel was not oriented about the type of fruit juices mixed in each punch.

Statistical analyses

The scores of 62 samples were subjected to statistical analysis, applying the Kruskar and Wallis 'H' test criterion, to test the hypothesis of no difference between the samples (punches) (Steel and Torrie, 1960). Multiple regression equation was fitted to the data to explain the relationship between the dependent variable, overall acceptability, with the other three independent variables colour, flavour and consistency. Coefficient of multiple correlation was computed, in order to measure the extent to which variation in the dependent variable overall acceptability is associated with the variation in the three independent variables. The closeness of association between the overall acceptability, with each of independent variables after the effect of other variables have first been removed, was estimated by calculating partial correlation coefficients and also beta coefficients which reduce the net regression coefficients on a comparable basis (Ezekiel and Fox, 1953). In order to make analysis and discussion easier, code letters (A to J) have been attached to each of the ten fruits as follows:

Wood apple—A, Chakota—B, Hebbalasu —C, Cashew apple—D, Punarpuli pulp—E, Punarpuli skin—F, Passion fruit—G, Yelachi—H, Jamnerale—I, and Kobrikayi—J.

Results and Discussion

For all the four characteristics studied, i.e., colour, flavour, consistency and overall acceptability, Kruskar and Wallis test criterion-H was highly significant and hence the null hypotheses that all the 62 samples came from the same population were rejected. This evidently indicates that the taste panel had preferential likings in respect of some of the samples tasted. Hence based on the average scores of the samples, they were arranged in order from high to low for attributes. Table 1 shows 20 combinations of the punches that were top scored on the average. A close study of the table reveals that Hebbalasu (C), Cashew apple (D), Punarpuli pulp (E) and Passion fruit (G) appear very frequently in all the characteristics studied. Majority of the combinations of the juices that were found in the list of appearance, flavour and consistency are found in the list of overall acceptability. The multiple regression equation fitted to the data is as follows:

$$Y=36.06+1.11\ x_1+1.16\ x_2+0.44\ x_3$$

where Y denotes overall acceptability,

x_1 denotes colour,
x_2 denotes flavour and
x_3 denotes consistency.

This meant for every unit increase each in (1) colour, (2) flavour and (3) consistency scores, overall acceptability increased by (1) 1.11, (2) 1.16 and (3) 0.44 units respectively. These three independent characteristics had contributed for an overall acceptability at different rates. Moreover flavour

TABLE 1. *Fruit punches scored highest in the order of preference for the attributes studied*

Order of Preference	Attributes			
	Appearance	Flavour	Consistency	Overall acceptability
1.	CDEGJ	ACDGJ, CEDGJ	CDEGJ	CDEGJ
2.	BCDGJ	CDEFJ	ACDEF	ACDEF
3.	ACDEJ	DEFGH	ABDGJ	ACDGJ
4.	ABDGJ	ACDEF	ACDEG	CDEFJ
5.	DEFGJ	CDEGJ	BCDGI	DEFGH
6.	ACDGJ	ACDEG	DEFGJ	ABDGJ
7.	DFHIJ	DEFGI	BDEIJ	BDEIJ
8.	ACEGJ	BEFGI	ACEGJ	ACDEG
9.	CDEFJ	CDEFJ	DEFGH	DEFGI
10.	ACDEF	DEFGJ	CDEFJ	BCDGJ
11.	CFGHJ	ABDGJ	ACDGJ	BDEFI
12.	BFHIJ	BCDGJ	ABCEG	ACEGJ
13.	ABCEG	ACEGJ	ACDEH	CDEGH
14.	BFGHJ	BDEIJ	CFGHJ	CDEFJ
15.	DEFGH	ACDEH	BFHIJ	DEFGJ
16.	CDGHJ	BFGHJ	BDEFI	DFHIJ
17.	BCGHJ	CDEGH	ABFGJ	BFGHJ
18.	ABCDH	CDGHJ	BEGIJ	ACDEH
19.	ACDGH	CDHIJ	CDEGH	ABCEG
20.	ACDFG	ABCEG	ABEGJ	CFGHJ

A—Wood apple, B—Chakota, C—Hebbalasu D—Cashew apple, E—Punarpuli pulp, F—Punarpuli skin, G—Passion fruit, H—Yelachi, I—Jamnerale, J—Kobrikayi

predominates over other characteristics as determined by its higher rate of contribution 1.16 (The multiple correlation coefficient computed is as high as 0.915, which is highly significant and showed that 91.5 per cent of the variation in the overall acceptability was explained by the characteristics taken into account). The importance of the three independent characteristics might be compared by their partial correlation coefficients and beta coefficients as given below:

Independent variable	Variable held constant	Coefficient of partial correlation	Beta coefficient
Colour	Flavour, consistency	0.24	0.31
Flavour	Colour, consistency	0.65	0.75
Consistency	Colour, flavour	0.34	0.32

It could be observed that rank of the three variables have been the same for both the coefficients, indicating the closeness of association with the overall acceptability. Table 2 shows frequency of individual fruit juices appearing among the twenty blended juices scored highest in order.

TABLE 2. *Frequency of individual fruit appearing among the twenty blended juices scored highest in order*

Name of the fruit	Frequency of appearance			
	Appearance	Flavour	Consistency	Overall acceptability
Wood apple	12	7	9	8
Chakota	8	7	10	7
Hebbalasu	15	14	12	12
Cashew apple	15	19	16	17
Punarpuli pulp	9	16	15	16
Punarpuli skin	11	10	10	12
Passion fruit	14	15	16	14
Yelachi	12	7	6	6
Jamnerale	2	6	7	4
Kobrikayi	16	14	14	14

To briefly discuss the characteristics studied of the blended juices would be:

Appearance: Kobrikayi which was present in 16 out of 20 blends listed shows that this juice can be used for blending with many fruits of the study. It has a light yellow colour and very mild flavour, so it does not bring in any negative scores when added with other fruit juices. Hebbalasu and cashew apple, both were accepted for their appearance, were next in order. Passion fruit stands almost at the same level in its mixing capacity with other fruits for appearance. Fourth in order of high frequency was Wood apple and Yelachi followed by Punarpuli skin as the fifth among highly frequented juice in 20 blends.

Flavour: Cashew apple juice mixed blends appeared in 19 out of the top 20 punches. Next in order were Punarpuli

pulp, passion fruit mixed blends followed by Hebbalasu and Kobrikayi having the same frequencies. In the previous study (Part I of this paper), when tested for grading individual fruit flavours, cashew apple juice scored highest. In the blended fruit juices also the same flavour of cashew apple predominated the list. Similarly, passion fruit and Kobrikayi had had the same rate of acceptability in blends as found in the study of single fruit juice. Flavours of natural fruits contributed for acceptability in this study also. The significant point noticeable here is that these fruit punches have obtained flavours by natural fruits themselves and not by addition of extracts or essences of synthetic nature. Natural food lovers might like these blends better than many ready-to-drink beverages with artificial flavours and colours.

Consistency: Though consistency of a fruit juice was not the major influential factor, the list showed that thinner and homogeneous nature of fruit juices like cashew apple and passion fruit might be the quality factor preferred for greater acceptability. Punarpuli pulp, Kobrikayi and Hebbalasu were rated next in order within the 20 listed punches.

Overall acceptability: Blends with cashew apple juice were found the highest number of times among the 20 highly rated punches. Then Punarpuli pulp, passion fruit and Kobrikayi, and Hebbalasu and Punarpuli skin, were found as frequently as in the cocktails, studied in order. Though Jamnerale, Yelachi could be acceptable as individual juices in the other study, they appeared less frequently and wood apple and Chakota seem to have been moderately liked, comparatively. The latter juices could be used better for punches than for single juices.

Reuniting flavours and eliminating undesirable components of the same or different juices became the basis for blending of a wide variety of flavours, colours and consistencies in this study. Blending fruit juices such as guava, papaya and passion fruit which are rarely known for making beverages has been indicated by Woodroof (1974). He further indicates that in the manufacture of blended juices, one of the traditional or popular juice has been used as a base, others are used to build up beverage qualities. In the present study, this point has not been considered and all the blended juices have been from newer fruits and blended in equal volumes. In this study, juices were blended so that if one fruit is cheap but not so well acceptable, it could be mixed with other costlier fruit and increase the utilization of the cheaper fruits. If the colour, flavour or consistency of one fruit is too strong, it could be diluted with other fruit which lack in these characteristics and just like the supplementary effect of protein foods in cereals and pulses, these fruits if not substantially compensate amino acids of protein, they could possibly compensate the minerals and vitamins available in them. For example, passion fruit is rich in vit. A value, but low in protein, and calcium, which could be obtained by mixing with the fruits such as Wood apple, Yelachi or vit. C from Chakota. Probable reason for the lowered scores for many of the punches was sediments settling at the bottom or not being smooth tasting for the palate. Ishii and Yokotsuka (1971) demonstrated the use of microbes for clarification of fruit juices which has promising future in fruit beverage industries. Perhaps, further work by application of such microbes, enzymes or even natural stabilizers such as carob gum (locust bean gum), agar, gelatin and low methoxy pectins can be tested (Jones, 1973). Blended fruit juices by hand-shaking of flasks were scored and placed one point lower than the scores for mechanically blended fruit punches. There was difference in appearance as the sediments that were settling at the bottom were suspended at

the top. The taste was different and better. This might be because of the incorporation of air in the juice while blending. Juice became thicker and smooth in appearance.

Bitter flavour of Chakota though accepted in a few blends, it was one of the drawbacks for many of the blends which had their scores low. So we can remark that a fruit like Chakota as a single fruit juice if not accepted, as a blend at least, it could be suitable for punch preparations with selected fruits.

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COMPARISON OF DIFFERENT METHODS OF ESTIMATION OF SULPHUR DIOXIDE IN FRUIT BEVERAGES

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Abstract

Ripper's Iodometric Titration Method and Distillation Method using iodine are the methods commonly used for the determination of SO_2 in fruit beverages and alcoholic drinks. These methods are not very accurate due to inherent errors as compared to Monier-Williams method modified by Shipton, but Ripper's Method is very rapid and SO_2 can be determined in large number of samples (8-10 samples) at a time and requires only ordinary glasswares. To compensate the errors, regression equations have been formulated. The predicted values calculated on the basis of linear regression equations are close to the values obtained by Monier-Williams method modified by Shipton (Reference method) for the concentration of SO_2 over the range of 50-400 ppm. The linear regression equations are very highly significant ($P<0.001$).

Introduction

Sulphur dioxide has been used in food preservation since ancient times. The extensive application of sulphur dioxide in various fields has been mainly responsible for the development of analytical techniques. Monier-Williams, Joslyn and Braverman[1], Gehman and Osman[2] and Schuller and Veen[3] have critically reviewed various methods used for the quantitative determination of sulphur dioxide. Deibner[4] has given an excellent summary of methods used in wines and grape juice. There are gravimetric[5], volumetric[5,6] iodometric[1] and colorimetric methods[3] for the determination of sulphur dioxide in foods. The gravimetric and volumetric methods are time consuming, although they are fairly accurate. Colorimetric methods are very sensitive, accurate and require instruments such as photoelectric colorimeter, distillation apparatus etc., whereas the Ripper's iodometric method requires only ordinary glasswares and is not time consuming. The official (Monier-Williams) method for sulphur dioxide determination in food has been used to compare a new colorimetric method in a collaborative study on assay of sulphur dioxide in Dried Apricots by John. E. Brekke[7]. An attempt has been made to assess whether comparatively simpler iodometric and distillation methods which employ iodine as an oxidising agent can predict the values of SO_2 obtained by the reference method which will be of immense value to the Fruit Preservation Industry especially home and cottage scale units.

Experimental

(*a*) Mango ready-to-serve beverage having the composition—mango pulp 20%, Brix 20° and acidity 0.3% (expressed as anhydrous

citric acid) and mango squash having the composition—mango pulp 25%, Brix 45° and acidity 1.2% (expressed as anhydrous citric acid) were prepared for the experiment. The different levels such as 50, 75, 100, 150, 200, 250, 300, 350 and 400 ppm of SO_2 in the form of KMS were added to the samples (RTS beverage samples—50 to 100 ppm and squash samples—150 to 400ppm).

(*b*) Duplicate determination of SO_2 by three different methods were performed on each of the 2 randomly selected samples simultaneously.

Methods

1. *Estimation of sulphur dioxide in dried foods by Monier-Williams method modified by Shipton*[8] (*Reference Method*)

The sample is acidified and distilled. The liberated sulphur dioxide is swept off with carbon dioxide or nitrogen into cold hydrogen peroxide, where the sulphurous acid is oxidised to sulphuric acid. The sulphuric acid formed is titrated against standard sodium hydroxide using bromophenol blue as an indicator.

2. *Determination of sulphur dioxide in foods by Distillation method*[8]

The method is based on the distillation of sulphur dioxide from the sample, absorption in iodine and estimation by titration with standard sodium thiosulphate solution using starch as an indicator. The method is reliable and applicable to most foods provided that sulphides are not present.

3. *Estimation of total sulphur dioxide in foods by the modified Ripper titration method*

REAGENTS

(*a*) *Iodine solution:* Approximately 0.1N: (*i*) Dissolve 13 g of iodine and 20 g of potassium iodide in 50 ml of water. Transfer the solution to one litre volumetric flask and make up to volume with distilled water. (*ii*) 0.02N: Dilute 200 ml of the solution (*i*) to 1 litre and standardise against standard sodium thiosulphate solution or against arsenious oxide (4.95 g/lit. gives 0.1N solution).

(*b*) *Starch solution:* 1 per cent

(*c*) *Formaldehyde solution:* 40 per cent

(*d*) *Sodium hydroxide*—5N: Dissolve 100 g of sodium hydroxide pellets in water. Transfer the solution to 500 ml volumetric flask and make up to volume with distilled water. Calibrate the solution against standard solution of potassium hydrogen phthalate.

(*e*) *Hydrochloric acid*—5N: Transfer 445 ml of concentrated hydrochloric acid to one litre volumetric flask and dilute to volume with distilled water. Calibrate the solution against standard solution of sodium hydroxide.

PROCEDURE

Weigh two aliquots of 50 g of sample (juice, squash, etc.) into two ground stoppered conical flasks of 250 ml capacity and dilute with water (approx. 100 ml). Add 5ml of 5N NaOH to each. Stir gently, taking care not to beat air into the solution and let stand for 20 minutes. Add 7.0 ml of 5N HCl to one of the samples and gently stir to avoid local concentration of the acid, add 10.0 ml of 1 per cent starch solution and immediately titrate against 0.02N iodine solution to a definite dark blue end point (this titration measures the total iodine reducing substances of the sample). Let this titre value be 'a' ml.

To the second aliquot, add 7.0 ml of 5N HCl and gently stir to avoid local concentration of the acid. Add immediately 10 ml of formaldehyde and let stand for 10 minutes. Add 10.0 ml of 1 per cent starch solution and titrate against 0.02 N iodine solution to a definite dark blue end point (this titration measures the reducing substances other than sulphur dioxide). Let this titre value be 'b' ml.

CALCULATION

Quantity of iodine used by the total sulphur dioxide $= (a-b)$ ml

$$\text{Total } SO_2 \text{ (ppm)} = \left(\frac{32}{1000}\right) \times 0.02 \times \frac{(a-b)}{50} \times 10{,}00{,}000$$

OR

$$\text{Total } SO_2 \text{ (ppm)} = 12.8 \times (a-b)$$

Results and Discussion

The equilibrium constant for the binding of SO_2 with various sugars is generally dependant on the pH of the system. The fact that neutral sodium sulphite does not combine with carbonyl compounds and that the hydroxy sulphonic acids are rapidly decomposed on treatment with alkali was used by Ripper as the basis for the determination of total sulphur dioxide in wine by direct iodine titration. But according to Monier-Williams, the Ripper's method for the determination of total SO_2 has disadvantages due to inherent errors in the iodometric titration. However, by compensation of errors, results closely approximating those obtained by the distillation method may be obtained (Table 1 and graph). Ripper's method is simple, rapid and does not require any elaborate assembly of equipment or complicated reagents. Direct estimation of sulphur dioxide without prior distillation would be ideal for food products. Table 1 and graph show that it is possible to predict the values of SO_2 obtained by reference method with the help of Ripper's iodometric method and distillation method employing iodine as an oxidising agent using linear regression equations. The regression equations are:

1. $Y = 7.1185 + 0.9695\ X_1$
2. $Y = 13.3228 + 1.0122\ X_2$

Y = predicted value which closely approaches the value obtained by Monier-Williams method modified by Shipton.

X_1 = Value obtained by distillation method using iodine as an oxidising agent.

X_2 = Value obtained by Ripper's titrimetric method.

TABLE 1. *Relationship between the Three different methods of determination of SO_2 in fruit based beverages*

Sample No.	SO_2 added ppm	Estimated by*			Predicted values by using regressions	
		Shipton's (Y) standard	Iodometric distillation method (X_1)	Ripper's titrimetric method X_2	Y on X_1	Y on X_2
1.	50	49	42	33	48	47
2.	75	68	67	64	72	78
3.	100	98	89	86	93	100
4.	150	143	144	130	149	145
5.	200	190	190	176	191	192
6.	250	236	241	206	241	222
7.	300	292	290	270	288	287
8.	350	341	329	309	326	326
9.	400	366	382	369	377	389
Coeff. of variation		59.5	86.4	85.0		

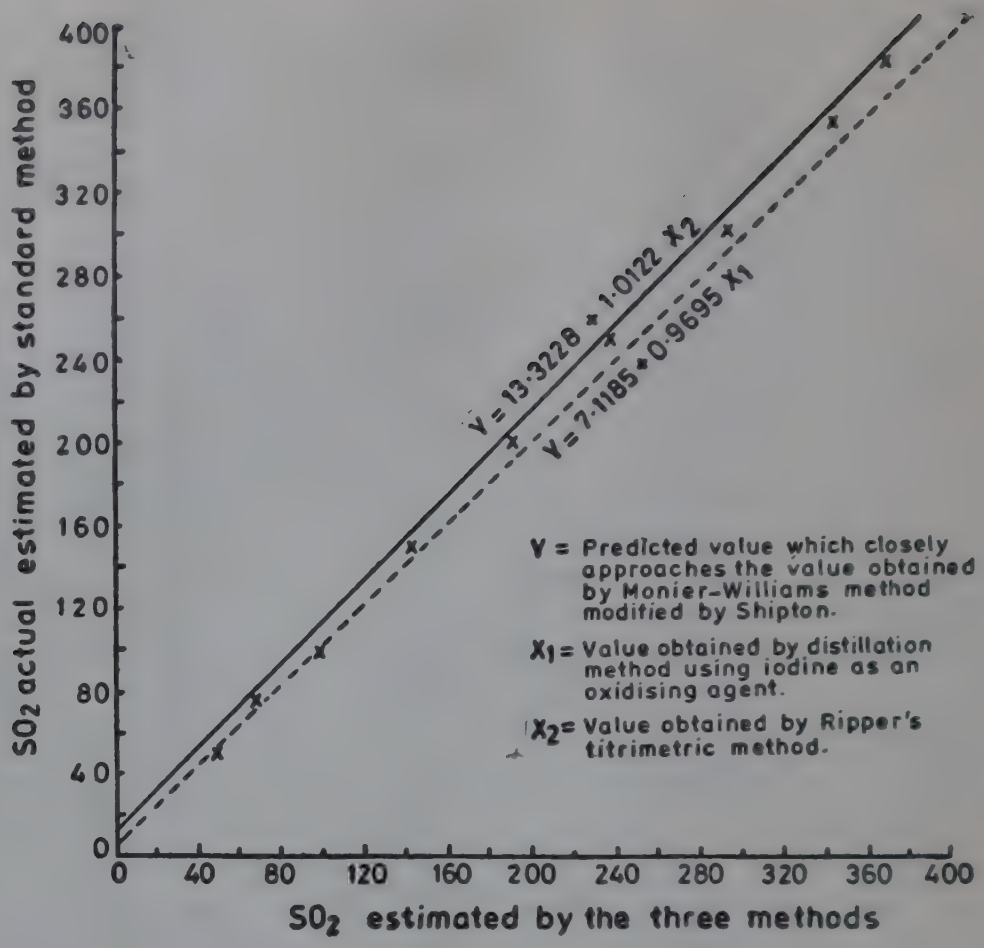
* Results are averages of quadruplicate readings per two randomly selected samples.

Regression of Y on X_1—$Y = 7.1185 + 0.9695\ X_1$

Regression of Y on X_2—$Y = 13.3228 + 1.0122\ X_2$

Note: both the regressions are very highly significant ($P < 0.001$)

The predicted values obtained (Table 1) by using linear regression equations for both Ripper's method and distillation method using iodine as an oxidising agent closely approximate to the values obtained by Monier-Williams method modified by Shipton. Further, the coefficient of variation of both the methods are almost the same (Table 1) whereas the reference method has a lower coefficient of variation. However, both the regressions are very highly significant ($P < 0.001$) showing that there is a definite relationship between the reference method and the two methods discussed, i.e., the Ripper's method and the distillation method using iodine as an oxidising agent. Ripper's iodometric method


400
360
320
280
240
200
160
120
80
40
0
0 40 80 120 160 200 240 280 320 360 400
SO2 actual estimated by standard method
SO2 estimated by the three methods
Y = 13·3228 + 1·0122 X2
Y = 7·1185 + 0·9695 X1
Y = Predicted value which closely approaches the value obtained by Monier-Williams method modified by Shipton.
X1 = Value obtained by distillation method using iodine as an oxidising agent.
X2 = Value obtained by Ripper's titrimetric method.

for the determination of total SO_2 coupled with the calculations of predicted values using linear regression equation Y=13.3228 +1.0122 X_2 will be of immense use to the Fruit Preservation Industry (home scale, medium scale and large scale) in checking and maintaining the limits for SO_2 under mandatory food laws such as Fruit Products Order and Prevention of Food Adulteration Act. The method can be of immense use to the food industry because of its simplicity and easy calculation involved in predicting the values. The application of this method for the determination of sulphur dioxide in fruit beverages other than mango is in progress.

Acknowledgement

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PHYSICO-CHEMICAL PROPERTIES OF SOME CITRUS ESSENTIAL OILS

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Abstract

Different samples of orange, lemon and lime oils were analysed for their physico-chemical properties and the results are tabulated. The oils analysed include cold-pressed, distilled and deterpenated orange, lemon and lime oils.

Introduction

Citrus essential oils are extensively used in processed foods, beverages, pharmaceuticals and perfumery. The oils are obtained mainly either by expression (cold-press) or distillation of the peels of *Citrus sinensis* (oranges), *Citrus reticulata* (mandarins), *Citrus paradisi* (grape fruits), *Citrus aurantium* (bitter orange), *Citrus aurantifolia* (limes) and *Citrus limon* (lemons).

While working in a project on deterpenation of citrus oils, a number of samples of citrus oils were collected from different sources and analysed to assess their composition. The data on the physico-chemical properties of the citrus oils presented here may be useful for all those interested in the subject.

Materials and Methods

The orange, lemon and lime oils obtained from abroad and within the country were analysed by the standard methods available in literature[1-3]. The oils analysed include cold-pressed, distilled and deterpenated or concentrated. Some of the deterpenated citrus oils were prepared in our aboratory[4]. The analytical data are given n Tables 1, 2 and 3.

Results and Discussion

The variations in the physico-chemical properties of the citrus oils analysed can be attributed to the differences in varieties, seasons of harvest, mode of oil extraction and treatments given. In general, the cold-pressed oils were highly coloured while the distilled oils were almost colourless. The analytical results showed that the values for specific gravity, aldehydes, esters, and evaporation residue of the deterpenated/concentrated oils increased with the increase in the content of oxygenated compounds while the optical rotation decreased. This is because the terpenes which show high optical rotation are either reduced or totally eliminated in the deterpenated oils. The terpeneless orange, lemon and lime oils were 20, 6 and 4 times concentrated respectively in their flavour as compared with their cold-pressed oils.

The terpeneless oils obtained by the column chromatographic method (using cold-pressed oils) were viscous or semi-solid and deposited waxes on cold storage. Highly winterised and distilled oils were almost free of waxes. Some of the cold-pressed citrus oils were found to contain 1 to 10 per cent waxes and the wax content of the terpeneless oils ranged between 20 to

TABLE 1. *Physico-chemical properties of orange and grape fruit oils analysed at 24-26°C*

Type of oil (1)	Colour (2)	Sp. gravity (3)	Ref. Index (4)	Opt. rotation (5)	Aldehyde (as decanal) % (6)	Ester (%) (7)	Acid No. (8)	Evap. residue % (9)	Solubility in 95% alcohol (volumes) (10)
Mandarin-Coorg	light-yellow	0.8252	1.4725	+95.4	0.65	0.54	1.75	2.93	1 vol. in 2 vol. Clear
Mandarin-Nagpur	Reddish	0.8487	1.4730	+102.6	0.56	0.43	0.95	4.50	1 in 3 Turbid
Mosambi (sweet orange)	Pale-yellow	0.8371	1.4722	+107.1	0.17	0.12	0.58	2.01	1 in 1 Clear
Orange (commercial) A	Yellow	0.8468	1.4715	+113.2	1.12	0.29	0.84	2.03	1 in 1 Clear
Orange (commercial) K	Yellow	0.8539	1.4730	+118.2	0.75	3.04	0.83	2.03	1 in 2 Turbid
Orange-USA	Yellow	0.8476	1.4710	+102.7	1.127	1.30	0.76	2.04	1 in 2 Turbid
Mandarin-London	Yellow	0.8584	1.4735	+68.7	0.57	2.24	2.03	2.50	1 in 2 Turbid
Mandarin-SA	Yellow	0.8553	1.4720	+93.9	0.58	2.75	1.03	6.88	1 in 3 Turbid
Terpeneless-Mandarin-Coorg	Dark-green	0.9044	1.4820	+17.4	9.64	8.40	19.31	49.82	1 in 1 Turbid
Terpeneless-Mandarin-Nagpur	Reddish	0.9583	1.4900	+25.4	5.23	11.56	20.18	69.18	1 in 1 Clear
Terpeneless-Mosambi-(*c. sinensis*)	Greenish-yellow	0.8982	1.4855	+20.2	5.05	7.61	25.06	56.18	1 in 1 Clear
Terpeneless Orange-ACW	Amber	0.8982	1.4760	+18.9	16.44	8.68	20.71	50.30	1 in 1 Clear
5X-Conc Orange-Israel	Bright-yellow	0.8632	1.4740	+87.7	2.82	3.32	2.89	10.91	1 in 1 Turbid
Conc. Orange-Sweden	Greenish-yellow	0.8726	1.4740	+103.4	0.56	3.59	1.79	11.13	1 in 1 Clear
5X-Grape fruit-Israel	Light-yellow	0.9097	1.4900	+74.3	1.54	13.30	3.64	31.05	1 in 3 Clear
Conc. Grape fruit-Sweden	Greenish-yellow	0.8880	1.4800	+105.4	1.43	8.29	0.69	18.97	1 in 1 Clear

TABLE 2. *Physico-chemical properties of lemon oils analysed at 24-26°C*

Type of oil (1)	Colour (2)	Sp. gr. (3)	Ref. Index (4)	Opt. rotation (5)	Aldehyde (as citral) % (6)	Ester % (7)	Acid No. (8)	Evap. residue % (9)	Solubility in 95 per cent alcohol (volumes) (10)
Lemon oil-A	Light-yellow	0.8600	1.4725	+67.78	2.80	2.36	0.657	3.27	1 in 3 Clear
Lemon oil-B	Light-yellow	0.8553	1.4720	+72.72	2.76	2.40	0.820	2.35	1 in 3 Clear
Lemon oil-C	Light-yellow	0.8523	1.4725	+80.15	2.56	0.23	0.835	2.00	1 in 3 Clear
Lemon oil-D	Colourless	0.9563	1.436	+21.74	1.18	1.20	1.342	1.72	1 in 2 Clear
Lemon oil-E	Colourless	0.8943	1.464	+48.74	1.12	2.13	0.964	3.28	1 in 2 Clear
Lemon distrilado	Light-yellow	0.8710	1.4760	+61.86	0.93	2.98	1.566	4.57	1 in 1 Clear
Lemon centrifugado	Light-yellow	0.9005	1.4845	+46.45	3.23	14.11	—	—	1 in 2 Clear
2X-Lemon oil of A	Light-yellow	0.8716	1.4740	+64.98	11.98	4.87	2.776	6.04	1 in 3 Turbid
Terpeneless lemon oil of A+5%oil of A	Yellow	0.9239	1.4785	+5.444	41.55	12.21	7.818	23.22	1 in 3 Turbid
Terpeneless lemon oil of A	Yellow	0.9301	1.4790	+2.640	37.08	12.57	8.168	25.08	1 in 3 Turbid
Terpeneless lemon oil of B	Yellow	0.9301	1.4805	+1.472	42.37	16.90	6.510	22.15	1 in 3 Turbid
Terpeneless lemon oil of C	Colourless	0.9035	1.4775	+0.7185	48.15	11.48	2.977	7.39	1 in 3 Turbid
Conc. lemon oil-D	Greenish	0.8786	1.4750	+52.18	4.78	6.47	1.502	16.14	1 in 2 Clear
Con. lemon oil-E	Yellow	0.8569	1.473	+60.54	3.36	2.21	1.100	3.12	1 in 2 Clear
Conc. lemon oil-F	Light-yellow	0.8786	1.476	+48.16	4.63	7.68	1.996	15.92	1 in 2 Clear
5X-lemon oil-Israel	Yellow	0.8786	1.4785	+48.07	—	—	—	—	1 in 2 Clear
2X-lemon oil-G	Colourless	0.8943	1.4785	+60.03	3.98	9.12	5.117	17.01	1 in 2 Clear
Terpeneless lemon oil-H	Light-yellow	0.9051	1.482	+8.886	5.25	14.42	5.589	14.84	1 in 2 Clear
Terpeneless lemon oil-I	Yellow	0.8974	1.4780	+1.688	44.22	18.42	1.654	5.26	1 in 3 Turbid
Terpeneless lemon oil-J	Light-yellow	0.8974	1.4755	—2.402	40.81	24.18	3.352	7.16	1 in 3 Turbid

TABLE 3. *Physico-chemical properties of lime oils analysed at 24-26°C*

Type of oil	Colour	Sp. gr.	Ref. Index	Opt. rotation	Aldehyde (as citral) %	Ester %	Acid No.	Evap. residue %	Solubility in 95 per cent alcohol (volumes)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lime oil	Light-yellow	0.8646	1.475	+38.84	1.37	1.248	0.721	2.53	1 in 3 Clear
Lime oil-B	Greenish-yellow	0.8632	1.469	+51.99	1.37	15.93	0.775	3.70	1 in 3 Clear
Lime oil-C (Cold-pressed)	Yellow	0.8818	1.484	+53.60	4.85	4.72	1.296	14.17	1 in 3 Clear
Lime oil-D (Distilled) Ceylon	Colourless	0.8726	1.4755	+58.02	1.896	1.98	1.586	3.90	1 in 2 Clear
Lime oil-E	Light-Yellow	0.8584	1.4745	+63.96	0.29	1.24	0.359	0.18	1 in 2 Clear
Lime oil-Sweden	Colourless	0.8802	1.474	+53.16	0.49	1.90	0.408	2.15	1 in 2 Clear
Lime oil (Distilled) Maharashtra	Colourless	0.8610	1.4750	+55.65	0.70	1.65	0.537	1.54	1 in 2 Clear
Conc. Lime oil-F	Colourless	0.8632	1.4740	+38.50	0.59	1.18	0.6719	1.742	1 in 2 Clear
Conc. Lime oil-Sweden	Colourless	0.8989	1.479	+44.85	6.96	11.10	4.113	12.65	1 in 3 Clear
50 per cent deterpenated lime oil from C	Light-brown	0.9315	1.4980	+22.26	9.88	7.80	3.784	33.81	1 in 3 Clear
Terpeneless lime oil from C with wax	Dark-brown	1.0210	1.5260	—0.9149	19.98	17.06	7.991	66.07	1 in 3 Clear
Terpeneless lime oil from C-dewaxed	Dark-brown	0.9750	1.5100	—	23.90	14.83	6.343	54.68	1 in 3 Clear
Terpeneless lime oil-G	Yellow	0.9592	1.4825	—0.900	6.09	5.42	5.648	19.36	1 in 3 Clear
Terpeneless lime oil-H (USA)	Colourless	0.8694	1.4740	+33.55	0.71	2.42	1.363	1.13	1 in 2 Clear
Terpeneless lime oil-I	Colourless	0.9128	1.4850	—12.41	1.05	5.11	1.851	0.92	1 in 2 Clear

37 per cent. The wax content was found to affect the solubility of the oils besides changing their physico-chemical constants.

The data on the physico-chemical properties of Indian citrus oils presented here generally agree with those reported in literature.[5] No comprehensive data were available on the properties of deterpenated Indian citrus oils before this work was undertaken. These values may be useful in formulating standards and specifications or assessing the quality of citrus oils. A combination of analytical and sensory methods may give a better picture of the quality of citrus oils.

Acknowledgement

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STUDIES ON DEFATTING OF PEANUTS AND SOYABEANS FOR DEVELOPING READY-TO-EAT SNACK ITEMS

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Abstract

A simple process of hydraulic pressing of soyabeans or peanuts in a perforated mould with plunger is described which allows 70 to 80 per cent oil in soyabeans and peanuts to be extracted with minimum alteration of the shape of the product. Optimum conditions for oil removal in both commodities have been established. Defatted peanuts or soyabeans obtained by pressing as described and restored to their original size were roasted or puffed in indigenously designed and fabricated roaster and explosive puffing gun, respectively, to give acceptable high protein ready-to-eat snack items. The products could be stored for periods upto one year at room temperature when packed in flexible pouches or metal cans. The process could be automated for large scale processing.

Introduction

Protein deficiency in the diet particularly of people from developing countries is one of the major nutritional problems still existing[1,2]. The nature and magnitude of the 'protein gap' has been discussed by the FAO and other UN agencies. The prospects of bridging this gap appear less promising than the possibilities of meeting the calorie requirements of the rapidly increasing population[3,4]. There is, thus, an urgent need to augment food protein supplies by tapping all available sources.

Abundant supplies of oilseeds (peanuts, soyabeans, etc.) in the protein-deficient countries have focussed attention on their importance as source of supplementary protein for human consumption[5,6]. In terms of quantity, oilseed could provide as much protein as that presently available from animal sources in the world today (about 30,000 million kg per annum), but only a fraction of this used as food. Traditional thought and attitude that oilcakes are fit only for animal feeding have largely prevented their use as human food[7]. The future for oilseed protein is, therefore, dependent on the application of science and technology to the processing of oilseeds to recover not merely valuable oil but to obtain hygienic edible grade protein products which can be used in processed foods.

There has been considerable interest in defatted peanuts and soyabeans due to their high protein value and increased shelf life, resulting from minimization of oil rancidity. There is also the important economic aspects that the bulk of the edible oil for which these crops are grown is recovered prior to the production of the pro-

tein-rich meal. To further the development of new products, dependable sources of high quality pressed soyabeans and peanuts must be available at specified quality and composition. To reduce such high quality pressed soyabeans and peanuts efficiently, economically and with facility, there was a need to explore the factors that affect oil removal from the seeds without their disintegration; in this manner, the defatted kernel could have a high degree of acceptability as a nut. Previous data for pressed peanuts were limited to one temperature[8-11], no precise data for pressed soyabeans are available.

In this paper, a simple process for production of defatted peanuts and soyabeans, using hydraulic pressing, has been described. By this process, 70 to 80 per cent oil from soyabeans and peanuts could be extracted with minimum alteration in the shape of the seeds. The seeds could be restored to their original size and shape. They could be converted into ready-to-eat snack item of high protein value by roasting or puffing in indigenously fabricated roaster or explosive puffing gun. Design and fabrication aspects of these machines and the quality of the products are also discussed.

Materials and Methods

Locally available large pod size peanuts, with and without skin and containing 6 per cent moisture and *Bragg* variety soyabeans containing 9 per cent moisture were used for the experiments. Polycell or polyethylene bags (700 gauge), aluminium pouches (400 gauge) and metallic cans of 250g capacity were used for packaging of final product. Moisture, fat and protein nitrogen were determined by AOCS[12] methods.

Moisture level adjustments

Peanuts or soyabeans were adjusted to moisture contents of 2, 4, 5, 7, 8, 9, 10 and 12 per cent either by drying in a tray dryer at 50°C to calculated moisture levels or by spraying calculated quantities of water and equilibrating at room temperature (24±2°C) for 24 hr in a sealed stainless steel container.

Skin removal in peanuts and dehulling of soyabeans

Skin removal of peanuts was carried out using a simple unit in which peanuts were passed through an airtight box equipped with brushes. Before this step peanuts were slightly roasted at 45-50°C for 1 hr to make skin removal easier. As the peanuts fall through the brushes the skins are loosened; an upward current of air not only prevents too rapid passage of the peanuts but separates the skin by blowing them into a collector. The same method was used for decuticling of soyabeans but after pressing the beans when the cuticles are disintegrated and loosened to a great extent. The bitter germ of soyabeans is also removed in this operation, thus benefiting the further processing[3,4].

Breakage of peanuts/soyabeans

To determine breakage, pressed soyabeans or peanuts were screened over 2 and 4 mesh screen to remove small pieces. Peanuts or soyabeans of less than 3/4 of a cotyledon were considered broken. Calculations for breakage include pressed peanuts or soyabeans before and after roasting or puffing[9].

Sensory Evaluation

Sensory evaluations for defatted, roasted and puffed peanuts or soyabeans were carried out by a taste panel consisting of 12 members from the scientific staff. 9-point hedonic scale was used for scoring for appearance, odour, flavour, texture and overall acceptance of the product. Average score of 4 tests are given.

Pressing

Pressing of peanuts or soyabeans was carried out in a standard 12,000 kg capacity laboratory hydraulic press (Figure 1). A perforated stainless steel mould 5 and 10 cm diameter of 100 and 200 g capacity with plungers were used in all tests. 100 g of peanuts (skins removed) or soyabeans with moisture content from 4 to 10 per cent and wrapped in fine cheese cloth were kept in the mould (5 cm diameter) with plunger and the whole assembly with an aluminium tray below for collection of oil was placed in hydraulic press. Peanuts or soyabeans were pressed using varied pressures from 17.5 kg/sq. cm to 351 kg/sq. cm in case of peanuts and 140, 280, 420 and 560 kg/sq. cm in case of soyabeans. Time of pressing in both the commodities was varied from 15 to 60 minutes. Pressing was carried either at 10°C in a cold room, room temperature or at 37°C in a specially heated room. Pressure was applied manually at an even rate with periodical adjustments whenever pressure dropped 1/2 per cent of the test pressure. Amount of oil pressed out was determined by weighing the material before and after pressing and expressed as per cent oil removed on wt/wt basis[5].

For continuous pressing, a vertical plate type hydraulic press which is self-contained could be used[6]. A platen is of the saucer type and a number of plates are provided. Oil bearing seeds, suitably prepared and confined by a filter mat or cloth, are placed on the plates. The oilseeds are pressed as the ram moves upward, and runs down to the platen and thence to weigh tank. Pin bars and pins are provided for holding the

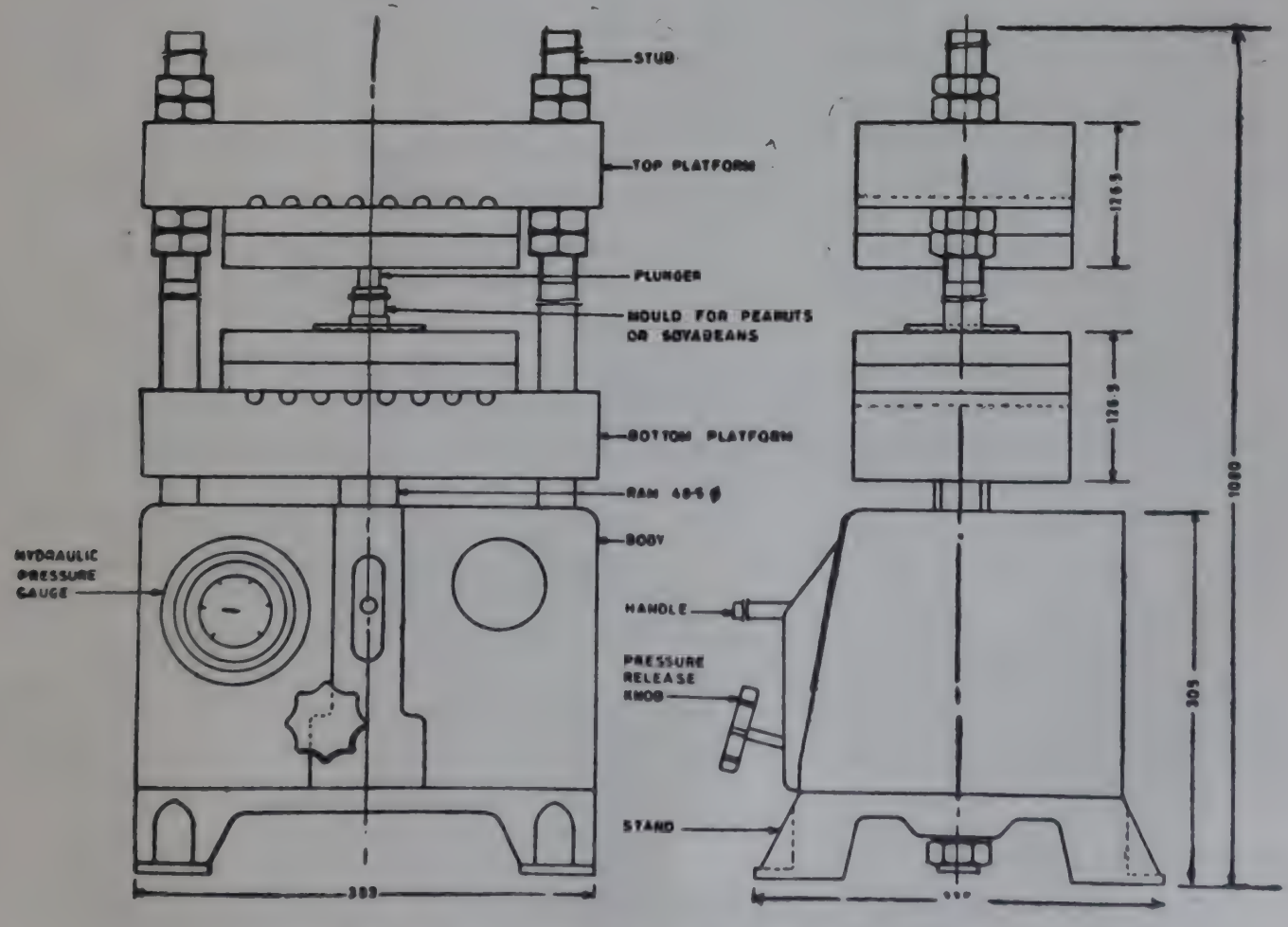

FIG. 1. Hydraulic press for peanuts and soyabeans

plates in the upper part of the press after pressure has been applied. The plates are lowered one by one, unloaded and reloaded mechanically without removing them from the press. The platen is actuated by one double acting main ram. This type of press serves for pressing the oil bearing seeds for oil removal on continuous basis. Pump and motor are mounted on the hydraulic oil reservoir of the press for mechanical operation. After pressing, the seeds in the form of pressed cake could be disintegrated into misshappen seeds by hammering the cake slightly in an hammer mill. The misshappen seeds are then allowed to pass on a conveyor. From the conveyor seeds are then collected in wire mesh trays or cages with cover for further processing.

Reconstitution or expansion

After pressing, the distorted peanuts or soyabeans were brought back to original shape by dipping them in measured quantity of water maintained at temperature from 4 to 87°C for 1 to 30 minutes. The ratio of water to peanut or soyabeans was also varied from 1.5:1 to 8:1. To facilitate handling, stainless steel wire mesh trays were used for dipping. The expanded peanuts or soyabeans were removed from water and allowed to drain for 1 minute. Moisture content was determined. 2 per cent salt on weight basis was added in water during expansion step to give salty taste.

Drying

The hydrated peanuts and soyabeans were dried to 9 per cent moisture level in an air dryer at 60°C to prepare them for roasting or puffing operations. This step also gives stability.

Roasting and puffing

The dehydrated peanuts or soyabea n were subjected to either puffing or roasting to impart palatability. For comparisons, same operations were carried out with fresh peanuts and soyabeans in which oil was not removed. Roasting of peanuts/soyabeans (100 g in weight) was carried out in an indigenously fabricated roaster (Fig. 2) at temperatures of 160, 170, 185 and 200°C for 5, 10, 12, 15 and 20 minutes. The roasted products were cooled immediately. Puffing of peanuts/soyabeans was carried out in an indigenously fabricated explosive puffing gun (Figure 3) at 180, 190, 200, 220 and 260°C temperatures, using superheated steam at pressures ranging from 1.75 kg/sq. cm to 6.3 kg/sq.cm for 2 to 5 minutes. The product was cooled immediately. After puffing, moisture content of the puffed product increased to a level of 15 per cent. To stabilize the puffed product, further drying of puffed peanuts or soyabeans to 2 to 5 per cent moisture was carried out in a tray dryer at 60°C for 2½ hr. The products, after roasting or puffing, were subjected to organoleptic quality evaluation.

Equipment Designed—Roaster for peanuts or soyabeans

For roasting of defatted expanded peanuts or soyabeans, to give a product acceptable as a snack item, a roaster as shown in figure 2 was designed and fabricated. The capacity of the unit is 2 kg of roasted product per hour. The design features of the roaster are: (1) High temperature in the range of 150 to 300°C can be obtained in a container within 10 minutes by changing the flame length of gas burners, (2) Uniform heating of the product during roasting is achieved by allowing the product to rotate on a heated surface of the container, (3) Speed of rotation of the product in the container during roasting can be varied depending on the nature of the product, and (4) The container in which product is roasted can be tilted with ease at any desired angle to avoid excessive heating of products.

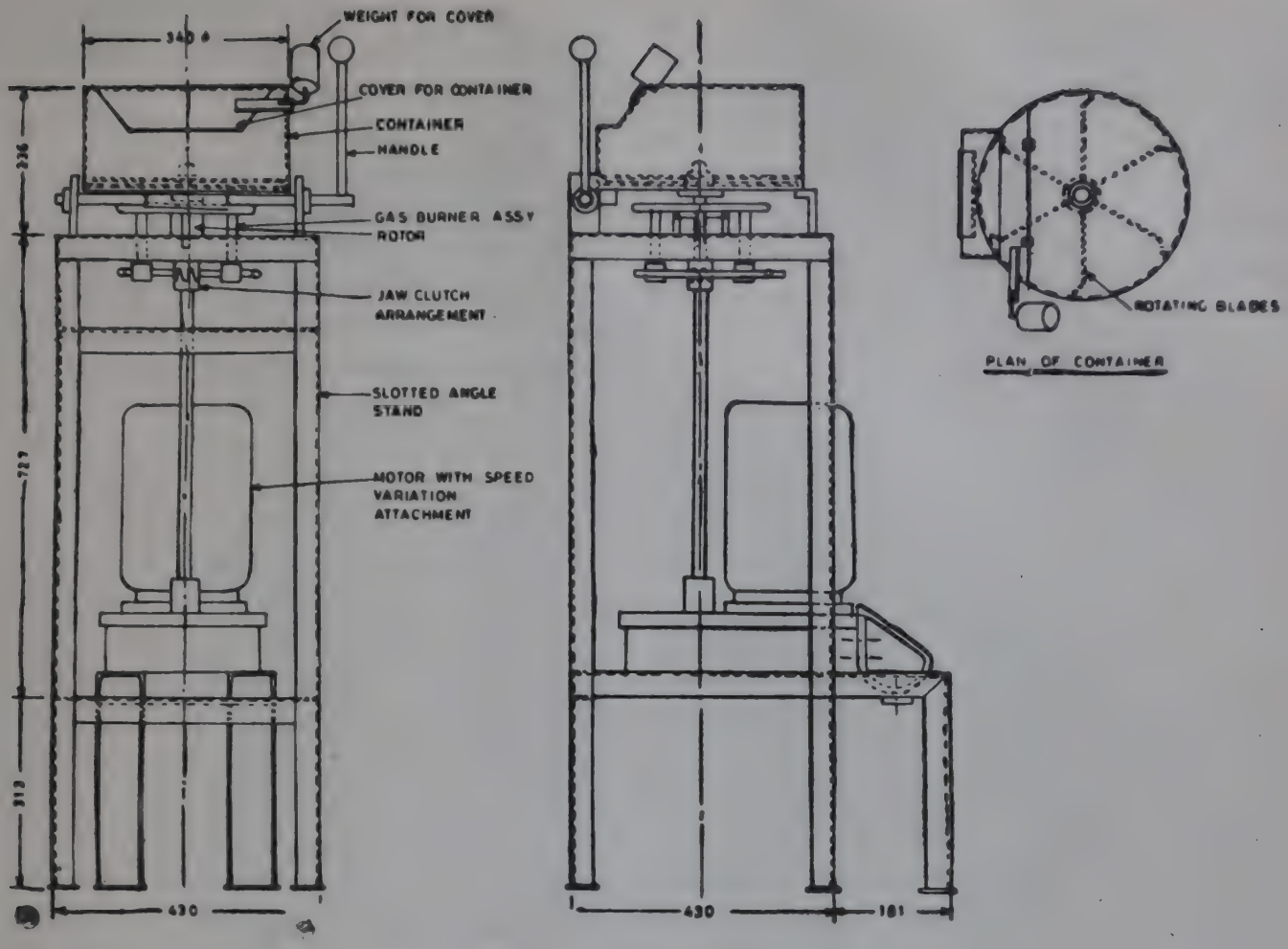

FIG. 2. Roaster for peanuts and soyabeans

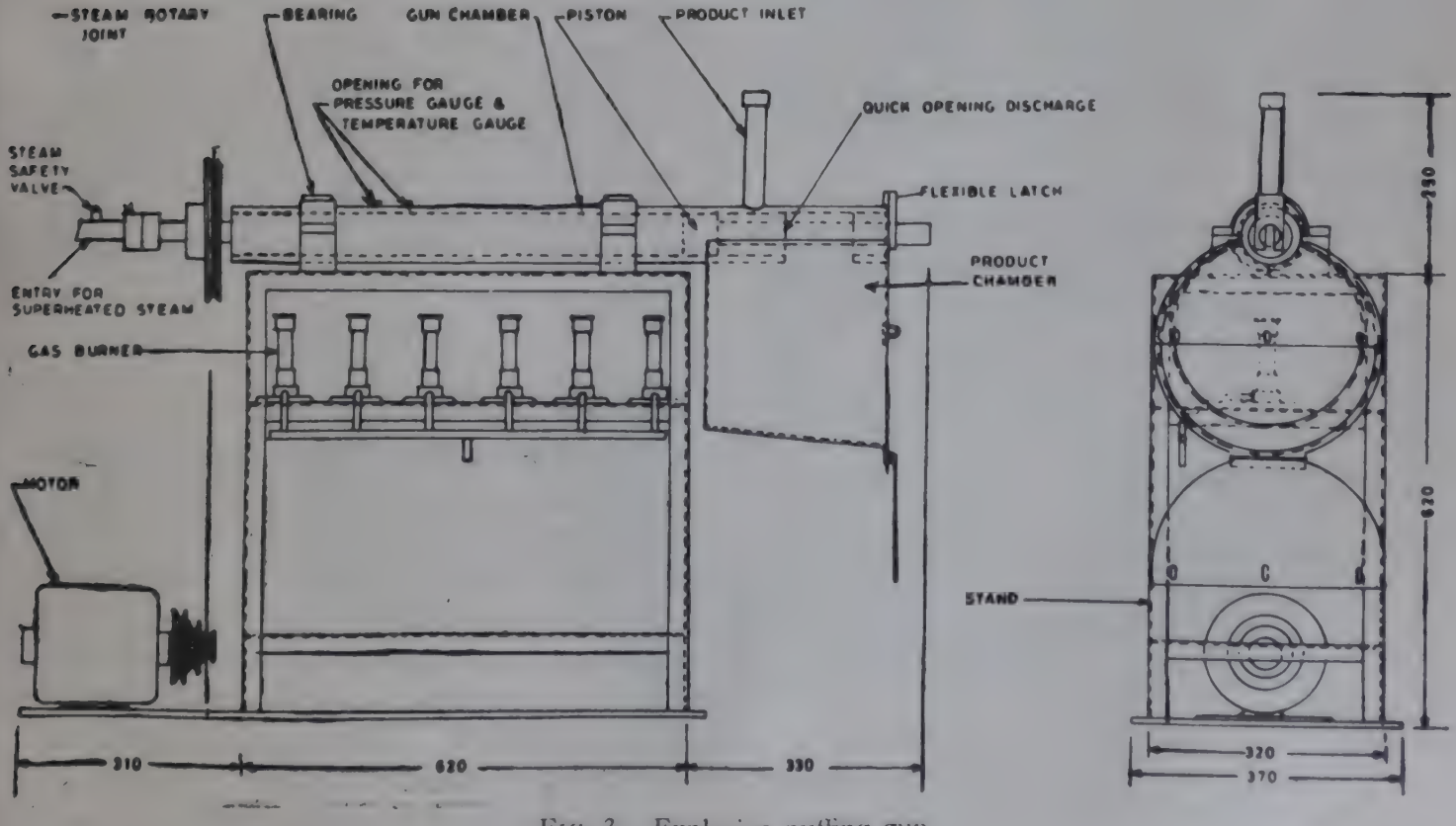

FIG. 3. Explosive puffing gun

The roaster consists of a stainless steel container (cylindrical in shape) fitted with a stainless steel rotor, having rotating blades in the form of spider, which allow rotation of product inside the container during heating for uniform transmission of heat to all portions of the product by conduction, and for prevention of development of hot spots and resultant charring.

The cover for the container is welded to a knob weighing 2 kg. to keep the container closed firmly during roasting operation. When the container is tilted the weight on the cover will fly apart quickly due to gravity and allow the container to be emptied quickly. The container is hinged on a rod which in turn is fixed on a slotted angle stand. A handle for tilting the container is also provided. The rotor of the container is aligned with a variable speed electric motor 1/4 HP, single phase A.C. for drive by a jaw clutch arrangement. As a result, variable speed of rotation from 10 to 100 rpm is achieved. The assembly allows the container with rotor arrangement to tilt easily at any desired angle for emptying the product or for controlling heating. Jaw clutch arrangement permits disengagement of the drive mechanism at will.

Ring type burner is placed below the container of roaster for uniform heating. Flame can be controlled by regulating the gas supply, and temperatures from 150 to 300°C can be obtained on the inside surface of the container within 10 minutes. The gas burner assembly is welded to the slotted angle stand of roaster in such a way that distance between gas flame and container could be varied as needed. Thermocouple probes are attached to the inside surface of the container for recording the temperature of roaster.

For large scale processing, a certain degree of automation could be introduced in the roaster. The combustion of gas burners could be controlled by putting an electrically operated solenoid valve in the gas supply system. The valve, when opened, will allow gas to flow and when closed will stop the gas supply. The coil of the solenoid valve could be actuated by a thermostat which will regulate the temperature in the container during roasting. The thermostat could be adjusted to any desired temperature needed in the roaster and then its on and off cutting will regulate the coil operation of the valve and, in turn, the roasting. Automatic tilting of the container after a predetermined time of roasting is possible by putting an electric timer, time-delay and mechanical arm or leverage in the system. The timer when actuated will provide a signal to the time-delay relay which, in turn, will operate the mechanical arm two times. Once the arm tilts the container by gripping its handle and allows the roasted product to fall down on a fine wire mesh conveyor, after a time delay of 60 seconds, it lifts the container and positions it on the slotted angle stand for continued roasting. Thus, continuity in operation could be maintained. The roasted product moving on wire mesh conveyor will be cooled by blowing air at a controlled rate below the surface of the conveyor. Product thus cooled can then be sealed automatically either in metal cans or in flexible pouches.

Explosive Puffing Gun

Explosive puffing differs from ordinary drying in two respects: (1) due to high temperature and high vapour pressure difference during puffing, the magnitude of driving force increases and drying cycle is shortened considerably more than conventional drying, and (2) the puffed material expands greatly. This expanded structure gives the desired property of 'instant' reconstitution. It also provides a large

area/volume ratio for good heat and vapour transfer. Crisp texture of the products obtained permits them to be used as snack items[7,8,9,20]. The gun fabricated (Figure 3) incorporates a number of features designed for improvement of product and ease of operation. These include a thin wall stainless steel gun chamber (10 cm in diameter, 75 cm long) with an inlet and a quick opening discharge arrangement for discharging the final product into a chamber attached to the gun.

External heating of the gun chamber at a uniform rate is achieved by gas burners placed below the surface of the chamber and by rotating the gun at a variable speed from 5 to 20 rpm. Rotation of gun is effected using a variable speed electric motor of 1/4 HP. Temperatures up to 300°C inside the gun chamber can be obtained by this arrangement within 10 minutes. For building a high pressure and high temperature in the gun chamber during puffing, the gun is connected at one end with superheated steam entry pipe via rotary joint. A steam safety valve, superheater and steam trap are provided in the steam line. Steam pressures up to 100 kg/sq.cm can be built up in a gun chamber for a desired time with this arrangement. The gun chamber along with external heating and steam inlet arrangements are mounted on a slotted angle stand.

The quick opening discharge arrangement as provided in the explosive puffing gun is operated as follows: Inside the puffing gun chamber, a stainless steel piston rod which can be moved forward, backward or locked in a desired position, is provided. Product to be puffed is charged through an inlet pipe inside the gun chamber after the gun has attained a desired temperature. Then, the piston is allowed to slide in and locked in position by a flexible latch provided on the outside of the gun chamber. Superheated steam is allowed to enter from the opposite end of the piston in the gun chamber. As a result, pressure inside the gun increases and the product filled in is subjected to high pressure and temperature.

After a predetermined time, the flexible latch arrangement for the piston is unlocked when the piston moves instantaneously in backward direction ejecting the heated product suddenly in a chamber which is at atmospheric condition. As a result of sudden change in pressure and temperature, the product gets exploded. Due to explosion, some of the water within the soyabeans or peanuts gets instantly vapourized and escapes forming tiny pores and cavities in the puffed product. The puffed product could then be further dried in a tray dryer for reducing its moisture content and thus increasing its storage stability. The same explosive puffing gun could be made continuous by using a cam instead of a flexible latch. Then, the cycle is such that the cam closes the discharge valve and stops. The material enters through the plug valve which is properly synchronized with the discharge valve. Steam enters the chamber after which the cam operates and the explosion occurs. Installation of automatic controls and temperature regulators in the superheated steam line will make the operation more efficient and continuous as may be desired. Thus, the same explosive puffing gun with certain modifications can be used for large scale processing.

Results and Discussion

Effect of moisture on the expression of oil from peanuts: Figure 4a shows the effect of moisture contents of peanuts on the oil expressed at a pressure of 140 kg/sq.cm. As the moisture content increases upto 6 per cent, percentage of oil removed increases but above 6 per cent moisture it decreases. Thus, it appears that optimum moisture

for peanuts for expressing oil is 6 per cent. Moisture content of peanuts prior to pressing has a significant effect on breakage of peanuts (Table 1). A moisture content of 6 per cent results in minimum breakage in peanuts while at lower moisture content breakage increases. Though slightly more percentage of oil was removed from peanuts with skin at 6 per cent moisture (Fig. 4a), further processing of pressed peanuts with skin became difficult. Hence in subsequent experiments, peanuts without skin were used. Thus, the moisture content of peanuts plays an extremely important role in expression of oil with minimum breakage in the nuts. The reason for less percentage of oil removal at higher moisture content may be because of the fact that pressing of peanuts decreases as the moisture content increases[8,9].

TABLE 1. *Effect of moisture on breakage of peanuts during pressing*[1]

Moisture in peanuts (%)	4.0	5.0	6.0
Breakage (%)	12.3	5.5	1.5

[1]at 140 kg/sq. cm pressure for 60 minutes

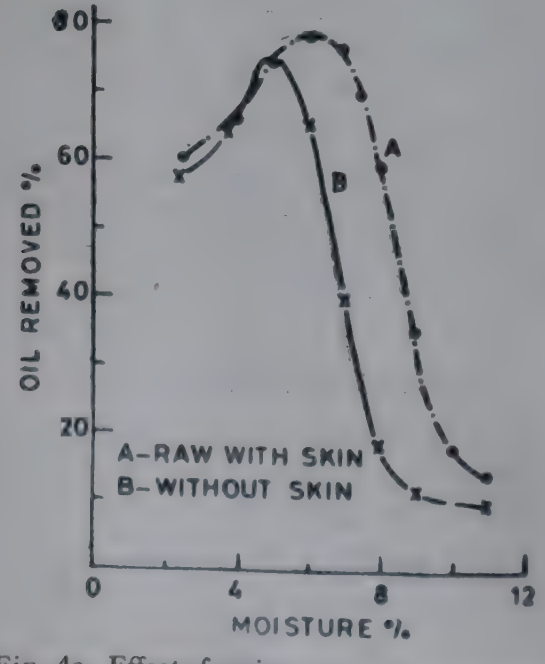

Fig. 4a. Effect of moisture content on removal of oil from peanuts under 140 kg/sq. cm pressure for one hour at 24°C

Effect of pressure and pressing time on removal of oil from peanuts: The effect of pressure and pressing time on the amount of oil removed is shown in Figure 4b. Here it may be seen that 80 per cent of the oil was removed from peanuts at a pressure of 140 kg/sq.cm in a 60 minute pressing time. This pressure and time were found to be optimum because, at higher pressures, breakage of peanuts increased to a great extent (Table 2) and, at lower pressures, even at longer pressing time the oil removal was considerably less (Fig. 4b). Therefore, 140 kg/sq.cm pres-

TABLE 2. *Effect of pressing time on the oil removed from peanuts*

Pressure (kg/sq.cm)	Pressing time (minutes)	Oil removed (%)	Breakage (%)
70	15	50.0	1.0
70	30	60.0	1.1
70	60	70.0	1.2
70	75	70.0	1.3
140	15	60.0	1.2
140	30	70.0	1.3
140	60	80.0	1.5
140	75	80.0	1.5
351	15	60.0	10.0
351	30	70.0	11.0
351	60	80.0	12.3
351	75	85.0	15.0

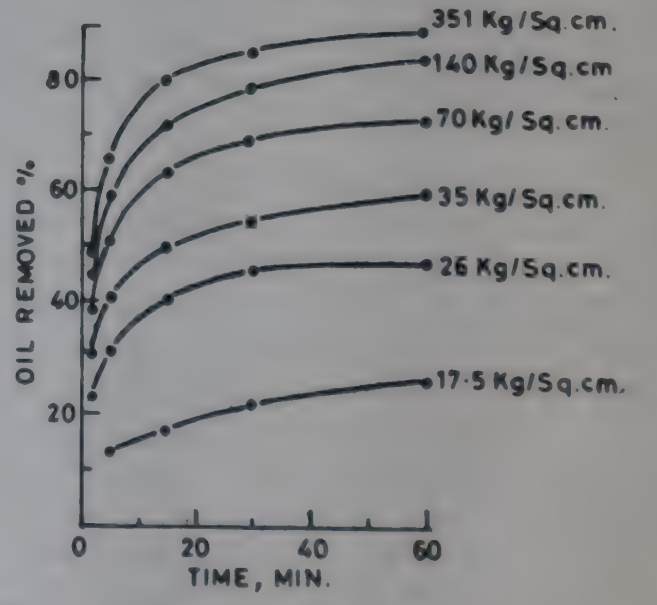

Fig. 4b. Effect of time and pressure on removal of oil from peanuts (6 per cent moisture and at 24°C) for a final cake thickness of 2.5 cm

sure and 60 minute pressing time were found to be the most suitable conditions for defatting of peanuts.

Effect of temperature on the removal of oil from peanuts: Table 3 gives the amount of oil removed from peanuts with different moisture contents at a constant pressure (140 kg/sq.cm) at different temperatures. As the temperature increases during pressing, percentage oil removed from peanuts at different moisture levels also increases but the gain at 37°C was not very significant as compared to that obtained at room temperature. Hence, from cost and convenience points of view, use of room temperature conditions during pressing is preferable.

TABLE 3. *Effect of temperature during pressing on the oil removed from peanuts*[1]

Moisture content (%)	Temperature (°Centigrade)	Oil removed (%)
4	10	58
4	24	60
4	37	61
5	10	65
5	24	68
5	37	70
6	10	75
6	24	80
6	37	82

[1]Pressing at 140 kg/sq. cm pressure for 60 minutes.

Effect of peanut cake thickness on oil removal during pressing: Table 4 shows the effects of peanut cake thickness on oil removal from peanuts at different moisture levels when pressed at 140 kg/sq.cm pressure for 1 hr and at different temperatures. Increasing the cake thickness of peanuts decreases the removal of oil and this decrease is greater at 6 per cent moisture level. Thus at 5 per cent moisture and at 24°C, oil removal decreased from 76.7 per cent for a peanut cake thickness of 4.75 cm to 71.9 per cent for a cake thickness of 14.10 cm—a difference of 4.8 per cent. At 24 and 37°C, at various moisture levels, there was little difference between the amounts of oil removed from peanuts with initial thickness of 8.50 and 14.10 cm. The radius of the test cake may have a similar effect as cake depth on the removal of oil; under the conditions used in the tests reported, the radius was not considered to be a factor.

Effect of temperature on breakage of peanuts: Table 5 shows effects of moisture and

TABLE 4. *Effect of peanut cake thickness on the oil removed*[1]

Temperature (° Centigrade)	Weight (g)	Cake thickness[2] Before processing (cm)	After processing (cm)	Oil removed at moisture of 4%	5%	6%
10.00	200.00	4.75	2.05	58.00	65.00	75.00
10.00	400.00	8.50	4.27	56.00	62.40	65.90
10.00	600.00	14.10	6.50	53.00	60.00	64.00
24.00	200.00	4.75	1.90	60.00	68.00	80.00
24.00	400.00	8.50	3.81	58.00	65.00	74.00
24.00	600.00	14.10	5.72	55.00	62.00	65.50
37.00	200.00	4.75	1.90	61.00	70.00	82.00
37.00	400.00	8.50	3.81	59.00	67.80	79.10
37.00	600.00	14.10	5.65	57.80	64.80	74.90

[1] Pressing 1 hr at 140 kg /sq. cm pressure

[2] Average values for 4 experiments

TABLE 5. *Breakage during pressing*[1] *at different temperatures*

Moisture (%)	Breakage (%) 10°C	24°C	36°C
4.0	12.3	5.0	4.1
5.0	6.5	2.5	2.0
6.0	3.6	1.5	1.3

[1]Pressing for 1 hr at 140 kg/sq. cm pressure

temperature on the breakage of peanuts pressed at 140 kg/sq. cm for 1 hr. Breakage decreases with increase in temperature at all moisture levels tested. However, while the decrease in breakage is reduced considerably by increasing the temperature to 24°C, it is reduced much less by further increasing the temperature to 36°C.

Water to pressed peanut ratio for dipping: Table 6 shows the effect of water to pressed ratio on the amount of increase in moisture content of the peanuts dipped for two minutes in water at 87-90°C. The increase in moisture content after two minutes dipping in water is practically the same above a water to peanut ratio of 3 to 1. When dipping time is increased from 2 to 7 minutes, amount of solubles removed by water also increases[21,23]. Hence, two minutes dipping time and water to peanut ratio 3 to 1 were considered to be optimum conditions for dipping.

TABLE 6. *Effect of water to pressed peanut ratio during expansion on moisture content attained*[1]

Water: Peanut ratio	Moisture content before dipping (%)	Moisture content after dipping (%)
1.5:1	8.3	25.1
2:1	8.3	27.3
2.5:1	8.3	30.0
3:1	8.3	36.2
4:1	8.3	36.2
5:1	8.3	36.3
6:1	8.3	36.4
7:1	8.3	36.4
8:1	8.3	36.4

[1]Pressed peanuts were dipped in water at 87-90°C for 2 minutes

Effects of dip temperature on expansion of peanuts in water: Previous work[21,22] has shown that for maximum expansion (10 to 25 per cent over the original raw peanut size) while roasting of partially pressed peanuts, the expanded wet peanut should have approximately 33 per cent moisture content. Water can be added directly to pressed peanuts with no loss of water solubles[25]. In the present procedure, pressed peanuts, with little or no added water, are expanded back to essentially normal size during roasting. Figure 4c shows the effect of temperature of water during expansion on the time required for pressed peanuts to gain water to about 36 per cent moisture content. The data in Figure 4c show that at water temperatures between 65.5 and 87.7°C, only two minutes were required for pressed

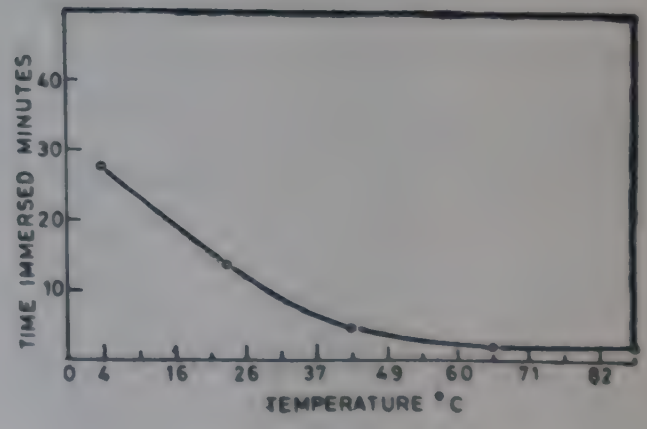

Fig. 4c. Effect of temperature on immersion time required for pressed peanuts to reach about 36 per cent moisture with a 3 to 1 water to pressed peanut ratio

peanut to gain moisture from approximately 8 per cent to 36 per cent. At room temperature (24°C), 15 minutes and at 10°C 31 minutes, were required to acquire sufficient moisture for optimum expansion during roasting. It may be desirable to conduct expansion of pressed peanuts at higher temperatures (65°C and above) to obtain higher production capacities and to minimize bacterial contamination. The same operation, when carried out using steaming procedure, took longer time (5 to 7 min) to regain the original size of peanuts offering no additional benefit. However, it would be preferable while considering large scale processing.

TABLE 7. *Effect of time and temperature of roasting on the quality of defatted peanuts*

Time of roasting (minutes)	Temperature of roasting (°Centigrade)	Colour and taste of product[1] (average assessment)
5	160	Fair
	170	Fair
	185	Fair
	200	Fair
10	160	Fair
	170	Fair
	185	Good
	200	Good
15	160	Good
	170	Good
	185	Very Good
	200	Good but charring of peanuts more
20	160	Good
	170	Good
	185	Very good but charring percentage increases
	200	More charring

[1]Evaluated by 12-member panel

Roasting of defatted peanuts: One effect of roasting temperature and time on the organoleptic quality of defatted peanuts is given in Table 7. A temperature of above 185°C was not suitable since it caused charring of the products. Lower temperatures requiring longer time for proper roasting are not advisable due to decreasing outputs. Moreover, roasting at 185°C for 15 minutes gave a product which was free from charring and was also judged as better than those produced using other combinations of time and temperature. Hence, this was taken as the optimum set of conditions for roasting of peanuts.

Time, temperature and pressure for puffing of defatted peanuts: The effect of various combinations of time, temperature and pressure for puffing peanuts, on the organoleptic quality of the final product, is given in Table 8. In general, increasing the time, temperature and pressure during puffing operation enhances blackening of peanuts. Using shorter time, higher temperature and higher pressure results in fair quality product. However, puffing at 190 ± 3°C for 3 minutes at 2.45 kg/sq.cm pressure was found to be optimum since it gave a very good product. In this operation, the size of puffed product was 2 to 3 times larger than that of the original product.

Analyses of defatted peanuts processed by roasting and puffing: Analyses of defatted peanuts processed under the optimum conditions of roasting and puffing are given in Table 9. Air drying of puffed defatted peanuts reduced the moisture content to 2.5 per cent. Both the products show similar analysis. A protein content of 43 to 44 per cent certainly qualifies these as high protein products. Fat content of 16 per cent and carbohydrate content of over 30 per cent will help to make these products a complete food.

TABLE 8. *Effect of time, temperature and pressure during puffing of defatted peanuts*

Time of puffing (minutes)	Temperature in the puffing gun (°C)	Pressure in puffing gun (kg/sq.cm)	Assessment of colour and taste of product[1]
2	180	1.75	Fair
	190	1.75	Fair
	200	1.75	Fair
	220	1.75	Fair
2	180	2.45	Fair
	190	2.45	Fair
	200	2.45	Fair
	220	2.45	Fair
3	180	1.75	Fair
	190	1.75	Good
	200	1.75	Good
	220	1.75	Good
3	180	2.45	Good
	190	2.45	Very good
	200	2.45	Very good but degree of blackening more
	220	2.45	Degree of blackening more

[1]Evaluated by 12-member panel

Storage stability of defatted peanuts: Roasted and puffed defatted peanuts were stored at room temperature in polycell bags (700 gauge), aluminium pouches (400 gauge) and metal cans under vacuum or nitrogen. Polycell bags and aluminium pouches were stored at 10-12°C as well as at room temperature. During storage, samples were removed and evaluated for quality at regular intervals. Moisture content of peanuts stored in polycell bags at room temperature increased considerably after 30 days of storage; as a result crispness of the product was lost. Samples stored in polycell bags at 10-12°C were quite good and acceptable for up to 3 months. In aluminium pouches and metal cans (sealed under vacuum or nitrogen), the samples retained crispness for 6 months and 1 year respectively. Thus, for immediate consumption, cellophane bags would be suitable since they are cheaper while for longer storage periods up to six months aluminium pouches and for up to one year metal cans would be suitable. Secondary packages like paper cartons could be used for transporting large numbers of small packs.

TABLE 9. *Analyses of defatted peanuts processed by roasting and puffing*

Material	Moisture %	Fat %	Protein %	Carbohydrate %	Ash %
Peanuts (As is)	6.0	49.8	26.7	15.0	2.5
Partially defatted roasted peanuts	2.7	16.6	43.2	31.2	6.3
Partially defatted puffed and dried peanuts	2.5	16.6	44.0	31.0	5.9

Effect of temperature, moisture, and pressure on oil removal from soyabeans: Figures 5, 6a and 6b, respectively, show the effects of temperature of 10, 24 and 37°C on oil removal at various pressures and moisture levels. Pressure was maintained at the indicated test level for 1 hr, since pressing for 1 hr was found to be optimum in preliminary experiments.

From these figures, it is clear that a temperature of 10°C during pressing yields less oil, while at 24 and 37°C almost equally higher yield of oil is obtained. However, at a pressure of 280 kg/sq.cm oil expressed

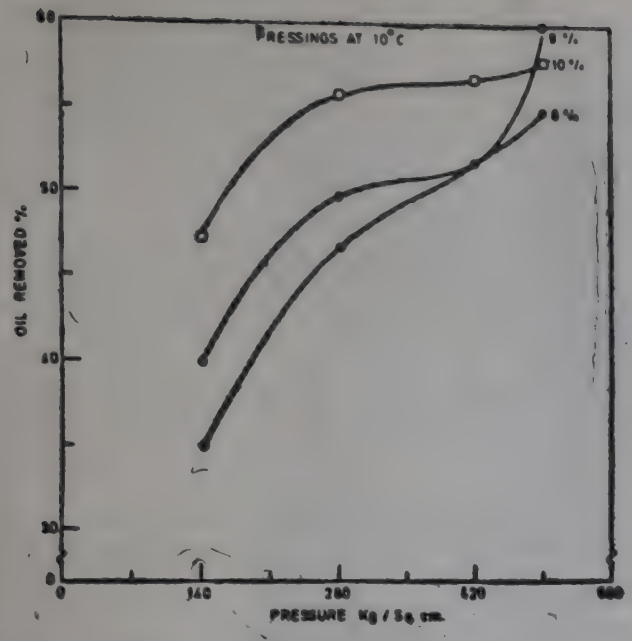

Fig. 5. Effect of pressure and moisture on removal of oil from soyabeans pressed for one hour at 10°C

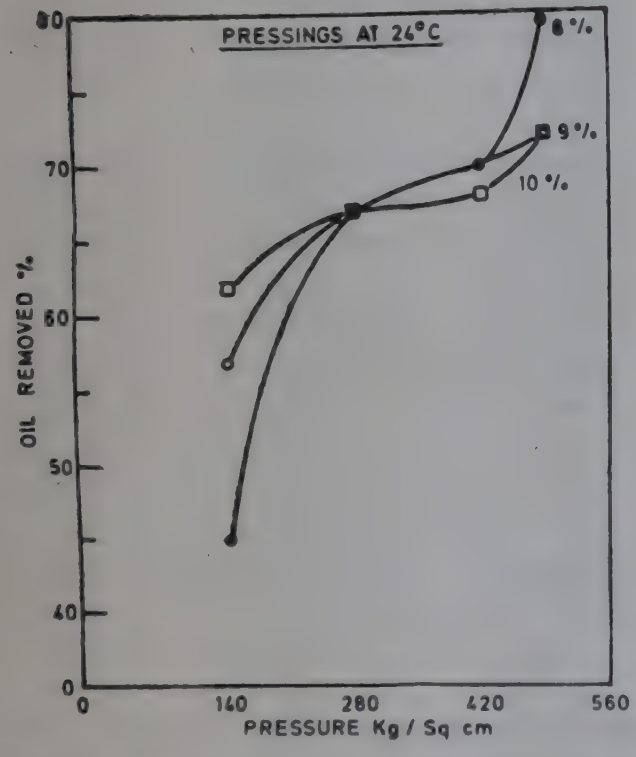

Fig. 6a. Effect of pressure and moisture on removal of oil from soyabeans pressed for one hour at 24°C

from soyabean at different moisture levels is much larger than at 37°C, except for soyabean with 10 per cent moisture. But, pressures higher than 280 kg/sq.cm increase breakage considerably (Table 10).

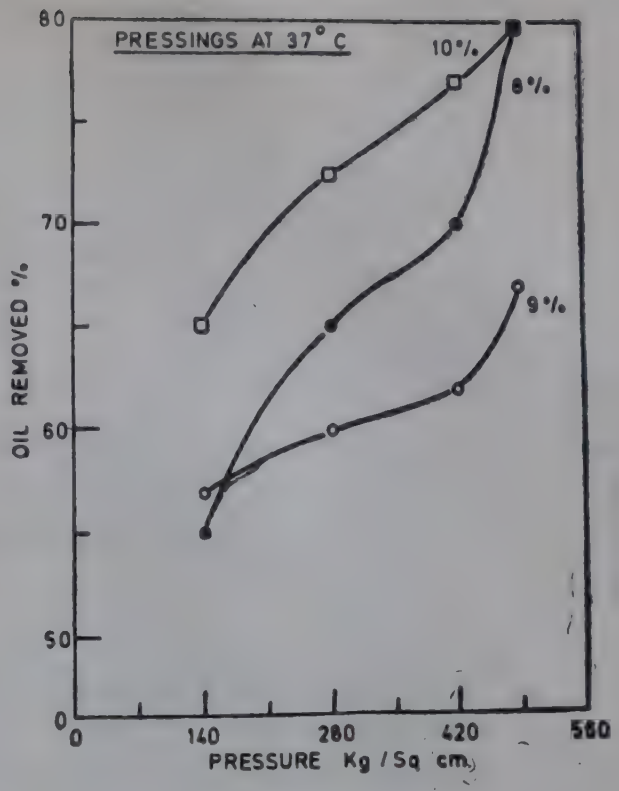

Fig. 6b. Effect of pressure and moisture on removal of oil from soyabeans pressed for one hour at 37°C

TABLE 10. *Effect of pressure on oil removal from soyabeans*[1]

Pressure (kg/sq. cm)	Oil removed (%)	Breakage (%)
140.0	55.0	1.0
280.0	70.0	2.0
420.0	75.0	12.5
490.0	79.0	15.0

[1]Pressing of soyabeans (9 per cent moisture) was carried out for 1 hr using indicated pressures at 24°C

With this point in view, it appears that pressing at 24°C at 8-10 per cent moisture level and at 280 kg/sq.cm pressure is quite suitable.

Analyses of soyabean before and after pressing under the optimum conditions are given in Table 11.

TABLE 11. *Soyabean analyses before and after pressing*[1]

	Moisture %	Fat %	Protein[2] %	Ash %	Carbohydrate %
Before pressing	9.00	18.0	40.00	4.22	28.78
After pressing	11.00	7.20	45.00	5.80	31.00

[1] Pressing at 280 kg/sq. cm gauge pressure for 60 minutes

[2] 6.25 × % nitrogen

Effect of soyabean cake thickness on oil removal during pressing: Table 12 shows the effect of soyabean cake thickness on oil removal during pressing at 280 kg/sq.cm for 1 hr. Increasing the thickness of the soyabeans from 2.50 cm to 10.00 cm yielded press cakes 1.26 to 5.80 cm thick approximately. Increasing cake thickness decreased the oil removal. The data show that when soyabeans containing 9 per cent moisture are pressed at 24°C, oil removal decreased from 66.7 per cent for a soyabean cake thickness of 2.50 cm to 61.9 per cent for a cake thickness of 10.00 cm, a difference of nearly 5 per cent.

Effect of moisture and temperature on breakage of soyabeans: Table 13 shows effects of moisture and temperature on the breakage of soyabeans pressed at 280 kg/sq.cm gauge pressure for 1 hr. Breakage decreases with increase in temperature or moisture or both. Even at a temperature of 10°C, excessive breakage of 15 per cent for 8 per cent moisture can be reduced to 2.5 per cent using beans with 10 per cent moisture. 2 to 2.5 per cent breakage at 24°C for 9 to 10 per cent moist beans seems low enough and may be considered acceptable.

TABLE 13. *Breakage during pressing*[1]

Moisture (%)	8	9	10
%Broken at temperature, °C			
10	15.0	8.2	6.3
24	8.0	2.5	2.2
37	2.5	2.0	2.2

[1]Pressing 1 hr at 280 kg/sq. cm gauge pressure

Reconstitution or expansion of soyabeans: The pressed beans were soaked in cold water for 24 hours at room temperature to reconstitute the beans. This increases the moisture content to 45 per cent. However, by dipping them in hot water at 87-90°C the same effect was obtained in about 2 minutes. Longer dipping time of 5 or 6 minutes did not give any additional benefit. Hence dipping for 2 minutes, with water to soyabeans ratio of 3:1, at a temperature of 87±3°C was

TABLE 12. *Effect of soyabean cake thickness on oil removal*[1]

Temperature (° Centigrade)	Weight (g)	Cake thickness[2] Before pressing (cm)	After pressing (cm)	Oil removal at moistures of 8%	9%	10%
24°C	200	2.5	1.2	56.7	66.7	67.2
	400	7.0	4.0	54.6	62.4	61.1
	600	10.0	5.8	53.9	61.9	59.2

[1]Pressing 1 hr at 280 kg/sq.cm gauge pressure

[2]Average of values for 8, 9 and 10 per cent moisture

considered as optimum set of conditions for soyabean expansion.

Roasting, puffing and drying of defatted soyabeans: A similar set of experiments was conducted for roasting, puffing and drying of defatted soyabeans as for peanuts reported above and the following conditions of roasting and puffing were arrived at: (1) roasting time of 10 to 12 minutes at a temperature of 200±3°C giving a final moisture content of 3 to 5 per cent in the roasted soyabeans; (2) puffing at a gun temperature of 260±5°C and at steam pressure of 6.3 kg/sq. cm (gauge) for a heating time of 5 minutes, giving a moisture content of 15 per cent in the puffed product, which was reduced to 3-5 per cent level by air drying at 60°C.

Storage stability of defatted, roasted or puffed soyabeans: Defatted, roasted, puffed and dried soyabeans were stored at room temperature and 10 to 12°C. Samples were removed at intervals and evaluated for quality. It was observed that moisture content of soyabeans stored in polycell bags at room temperature increased considerably after a month's storage; as a result, crispness of the product was lost to a great extent. Samples stored in polycell bags at 10-12°C were quite good and acceptable for up to 3 months. Quality, however, remained quite good for six months and 1 year when stored in aluminium pouches and metal cans, respectively. Defatted soyabeans packaged in metal cans, either in vacuum or under nitrogen (containing less than 2 per cent oxygen), proved satisfactory even after one year storage. Secondary packaging material, e.g., paper cartons could be used for bulk transportation as and when needed.

On the basis of these results, flow diagrams for processing of defatted peanuts or soyabeans on large scale for production of protein rich ready-to-eat snack items were arrived at, as shown in figures 7 and 8.

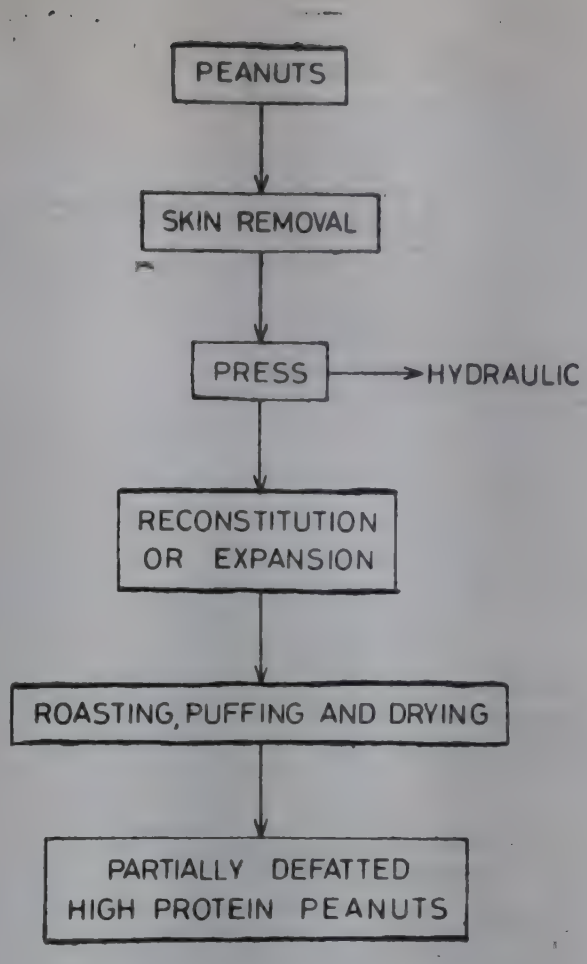

Fig. 7. Flow diagram of the process for peanuts

Use of defatted, roasted and dried soyabeans or peanuts

The roasted, puffed and dried defatted soyabeans or peanuts, produced by the above methods, may be used as dietary protein supplements and will especially meet needs during emergencies. Providing roasted or puffed beans or nuts in whole bean or nut form makes transportation, distribution and storage easy. The roasted and flavoured beans or nuts could also be used as snacks, appetizers, confectionery products and the like. Sweetened beans or nuts may be used to upgrade candy preparations[21,26,27]. Thus it may be seen that these products offer potential not only for producing many foods and confections but also for helping to focus attention on oilseeds as a good source of protein.

The cost of producing defatted peanuts or soyabeans by the above methods will be

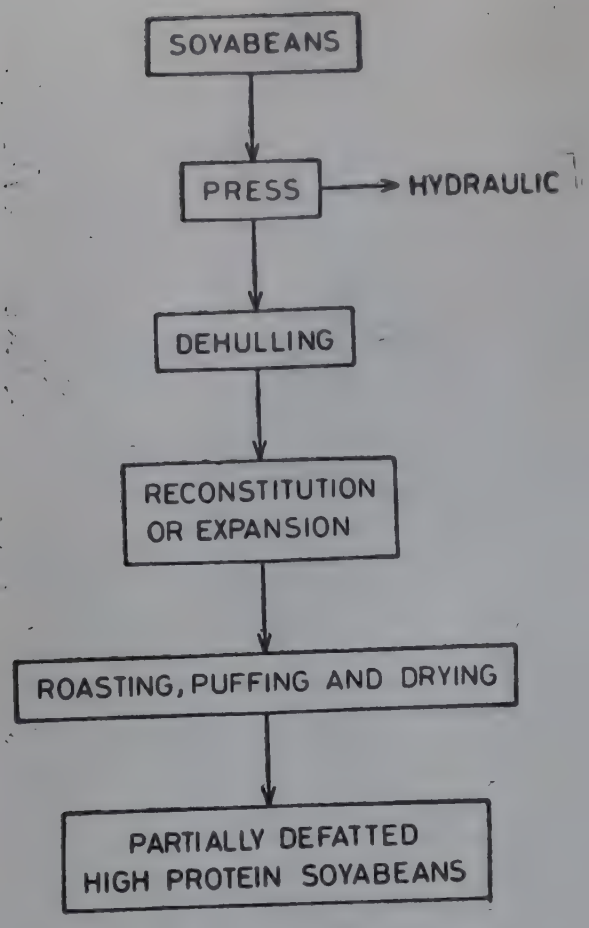

Fig. 8. Flow diagram of the process for soyabeans

less when reckoned with the cost of oil extracted and increased protein content of the products. The process does not entail a great increase in cost, since much of the additional expense of roasting or puffing is offset by the subsequent savings in dehydration. Removal of moisture in the later stages is the costliest part of the operation and could be reduced by use of fully depreciated equipment and proper selection of optimum processing conditions.

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Book Reviews

Cooling Technology in the Food Industry: by Aurel Ciobanu, Gabriela Lascu, Vasile Bercesu and Lidia Niculescu, Abacus Press, Tunbridge Wells, Kent.

Storage by refrigeration has become quite popular in food industries for storage of perishable food commodities, and also for transportation of such type of food materials. Moreover, it has also been shown that many foods, including the prepared ones, can be processed and stored in a more palatable and more nutritious form by freezing than by any other method.

The book on 'Cooling Technology in the Food Industry' not only covers the fields of practical guidelines but also covers the basic principles, thus presents a better comprehension of the technical literature.

The book is divided into three parts which collectively cover eighteen chapters. Part one, includes two chapters, and deals with the basic principles of food preservation by refrigeration and the effect of low temperature on foodstuffs. Part two covers five chapters concerning with the several systems using artificial cold as well as with airconditioning in food processing and preservation. The various chapters included in this part are chilling, freezing, airconditioning, additional treatment to refrigeration and freeze drying. Part three includes eleven chapters on the application of this technique to various foodstuffs, viz., meat and meat products, poultry, fish and fish products, eggs, fruits and vegetables, ice cream, prepared foods, fermented beverages etc.

The book is an English translation of the original and published in Romanian Language, and represents a compact and unitary review of the many aspects of the utilization of refrigeration in food processing and preservation. This will serve as an excellent reference book for the engineering students interested in this line as well as for those working in food industry.

F. C. Shukla

Introductory Food Chemistry: by Irad Garard, Ph.D., published by the AVI Publishing Co., INC., Westport, Connecticut, 1976, pp. 312; US $ 15.00, Soft ($ 46.00 Cloth).

The book starts with a chapter on origin of food chemistry. The author has tried to connect this subject to nutrition, law and industry. He has also tried to indicate to the new chemist, how he can proceed without guidance. In the following chapter, the author has given thorough treatment to the main components or nutrients of the food like fat, carbohydrate and protein regarding their composition, classification and properties. Chapters 5 and 6 are devoted to minor nutrients like minerals and vitamins. Even though these are minor in quantity, by no means they are minor in importance. The minerals are inorganic elements or compounds but vitamins are organic class of substances. Chapter 7 is devoted to food analysis. This is of importance to chemist to find out the nutrients in natural as well as processed foods. Colloids and food additives are dealt in chapters 8 and 9. In chapter 10 on food preservation, the author has emphasised the cause of spoilage is due to chemical changes. These may be attributed to any one of the reasons like microbiological action, enzyme activity, oxidation

and the absorption and evaporation of water. The spoilage increases with the increase in temperature. The author has given in brief methods to retard spoilage. From chapters 11 to 15, the author has described in brief the chemistry of 1. Dairy Products, 2. Oil and fat industry, 3. Cereal Products, 4. Sugar and related industries and 5. Convenience foods. Last two chapters are devoted to colours, flavours and food hazards.

For a thorough grasp of the subject every chapter is appended with references.

This is a good text book for students, who are interested in chemistry of food, and will serve as a guide to the chemists and home economists.

S. M. JAMBAGI

Fruit Juice Processing: Agricultural Services Bulletin No. 13, Ags: A58/13, by Hans J. Bielig, in collaboration with Joachim Werner, Food and Agriculture Organisation of the United Nations, ROME, 1974, pp. 103.

The bulletin gives practical information to improve the processing of agricultural products. The authors have dealt with the following topics: (1) Production of clear filtered juices and (2) Production of pulpy products from soft fruits.

The bulletin is divided into two parts. First part deals with manufacturing of fruit juice drinks, either still or carbonated and second part describes the fruit ingredients with emphasis on their nutritional components.

This bulletin starts with a flow sheet of (1) Juice made from concentrate, (2) Single strength juice and (3) Single strength pulpy juice. This flow sheet gives the reader an idea of all the steps involved in the processing of juices. Authors have described the steps from buying of fruits to storage and consumption. They have described every steps in a simple way with illustration, figures and information regarding time and temperature. Any technical personnel engaged in the manufacture of juices, by following these steps, will be able to produce a juice of good quality.

Other important topics like juice yield control, technique of bottling and filler systems, chemical preservation, deaeration, thermal treatment before bottling, main ingredient of juice manufacture 'Sugar Syrup' and plant sanitation are dealt separately.

Methods for processing passion fruit, guava and other fruits are given in this bulletin. Capital investment and labour demand for processing fruit juices are given separately.

In the end of the bulletin, authors have given fruit components, description of some fruits suitable for processing and list of some equipment suppliers.

In the last page, list of references is given for further reading.

This is a very useful bulletin for technical personnel. It provides enough information to establish fruit juice manufacturing units. The methods given are practical and are tried in the industry. Every library of research institution, technical college, factory and consultants must possess this bulletin.

S. M. JAMBAGI

Commercial Food Patents—U.S. 1975: by Hallie B. North, published by Oliver S. North, 812, South Ode Street, Arlington, Va 22204, U.S.A.

It is an acknowledged fact that patents do provide an avenue for R and D workers to make their efforts known to others, at the same time protecting the inventive aspect of the work. World over, patents are continuously scanned to update one's information base, and they are pointers to the cons-

tant technological development in the respective areas. Access to new patents can accelerate the pace of R and D work besides exposing the industry to newer developments.

In terms of volume, maximum number of patents are filed every year in United States and these patents are available at 50 cents a copy from the Patent Office. However, buying of all the patents can be an expensive proposition besides being time-consuming. In this context, the publication under review is a welcome development.

Abstracts, or bare listings or the like, of patents on food processing, apparatus, packaging, etc., are currently available in scattered sources and/or intermittent or periodic manner, for instance in CHEMICAL ABSTRACTS and at least three technical journals serving segments of the food industry. However, the effectiveness and usefulness of these various sources are impaired by such factors as high cost, scope uncertainties, coverage undependability, difficulty of information retrieval, and brevity and inadequacy of abstracts.

This book is designed to overcome or minimize those objections, and to provide the food processor and food process equipment supplier with subject-classified, fully-indexed abstracts of all US patents issued in calendar 1975 in the subject area. Full-page flowsheets or other useful diagrams are included for a number of patents.

This book covers substantially all of the significant US patents issued in 1975 on methods and processes for preparing commercially valuable human food products, human food compositions, apparatus for preparing commercial foods, and apparatus and methods for packaging specific foods. It does not include crop growing and harvesting practices and equipment, general packaging needs or apparatus, or food merchandising appurtenances (e.g., for markets and restaurants). Basically, coverage relates only to in-plant operations.

Abstracts printed herein appeared in weekly issues of the OFFICIAL GAZETTE, at various locations depending on their nature (mechanical, chemical, or electrical) and classification as assigned by the Patent Office. These abstracts are here classified into 21 chapters intended to be of greatest practical value to readers. Chapter titles are self-descriptive; however, it should be stated that wherever possible a patent is classed according to food type, rather than process. If a patent applies to relatively minor food items, or to a technology pertinent to more than one type of food product , the abstract will be found in the 'Miscellaneous' chapter.

COMMERCIAL FOOD PATENTS—U.S. 1975, along with other annual edition in this series, will prove to be a very useful, long-retained addition to the bookshelves of food company and food process equipment company executives, sales people, and particularly product research personnel, providing a long range key to industry developments by subject, assignee and inventor.

V. H. Potty

Rheology and Texture in Food Quality : by J. M. Deman, Ph.D., P. W. Voisey, V. F. Rasper, Ph.D., D. W. Stanley, Ph.D., University of Guelph, Ontario, Canada, published by The AVI Publishing Company, Inc., Westport, Connecticut, 1976; U.S. $ 20.00, Soft (US $ 46.00 Cloth).

The above four authors from Dept. of Food Science, University of Guelph, Ontario, Canada, have presented all the available information on food texture and food quality. Food texture has emerged as a distinct area of scientific activity and even a journal on food texture has been started recently. These studies are firmly based

on established principles of rheology and many new instruments have been developed to measure the physical properties. This book thus becomes very useful to students of food technology evaluating food quality.

The book covers 19 chapters in the following main areas: mechanical properties of foods, micro-structure of food, instrumental measures of food texture and interpretation of results from instrumental texture measurement along with specific chapters on texture of fruit and vegetable, dough, and baking products, fat and fat products, dairy products, meat products, chocolate, starch etc. The structural characteristics of food emulsifiers and the function of emulsifiers in food texture are dealt with two chapters. The sensory measurement of food texture, psychophysical structure are other subjects covered.

The various physico-chemical aspects and relation between these measurement and sensory evaluation have added value to the subject matter.

The book thus covers in about 600 pages the present state of knowledge with detailed bibliography from which further source material can be referred to.

The food rheology and texture are assuming very important role in food technology and this book is a timely addition to the understanding of this area.

C. P. NATARAJAN

Spices and Condiments: by J. S. PRUTHI, National Book Trust, India, New Delhi, 1976, pp. 270 + (i to iii), Price Rs 14.50.

Reading through the book, one realises the enormous effort that has gone into producing this handsome and informative book on Spices and Condiments. The reviews are comprehensive and highly informative.

It is for the first time that a major Indian scientific and non-technical book has been published to deal solely with Spices and Condiments to make it as simple as possible. The National Book Trust of India has got the privilege for having thought of bringing out this small handbook on spices for the benefit of the interested readers. The available voluminous information lying scattered in old, out of print, rare and costly publications/magazines, which may not be easily available to a layman or even to technical hands, at times, has been presented in a concise and impressive manner in this publication.

Even today, spices and condiments play quite an important role in the National economics of several producing and exporting countries. India is one of the major spice producing and exporting countries of the world. India alone contributes 25-30 per cent of the total world trade in spices. It is interesting to note that nine spices namely: pepper, ginger, cloves, cinnamon, cassia, mace, nutmeg, pimento (allspice) and cardamom alone contributed as much as 90 per cent of the total world trade. Pepper is, by far, the most important spice. Among the importing countries, the U.S.A. is the largest. Recently, the U.S.S.R. too has become an important market. Several other countries like Australia, Britain, Canada and some European countries also import spices.

The term 'spices and condiments' applies to such natural plant or vegetable products or mixtures thereof in whole or ground form as are used for imparting flavour, aroma and piquancy to end for seasoning of foods.

This particular book covers about 70 spices which are grown in different parts of the world. Many of these are grown in India. Spices comprise different plant components or parts such as floral parts, fruits, berries, seeds, rhizomes, roots,

leaves, kernels, aril, bark, bulb or other parts of the spice plants.

Spices are well-known as appetizers and considered essential in the culinary art all over the world. They add a tang and flavour to otherwise insipid foods. Some of them also possess antioxidant properties, while others are used as preservatives in some foods like pickles and chutneys etc. Besides, several spices have anti-bacterial activity and are also used in different forms in medicine and cosmetics.

Each of the 70 spices are systematically described under the following sub-heads: Nomenclature, description, distribution, quality or composition and uses. It is a common experience that the same spice is known by different vernacular names in different parts of the country. In order to identify the correct spices, along with the Indian vernacular names, the common English names as well as the scientific or botanical names have also been given in respect of each of the 70 spices, as approved by the International Organization for Standardization (ISO). Attractive colour and black and white illustrations are interesting, informative and help in better understanding of the subject. A comprehensive glossary of technical terms has also been provided to assist the readers.

In nutshell, the handbook is highly useful to both educated laymen as well as to technical persons engaged in research, teaching, technological and medical profession. It should be a useful addition to libraries in Food Science and Technology, especially in Horticulture.

In order to further widen the scope of readership of this useful popular English edition, the National Book Trust will do well to get simultaneous translations of this book into important Indian languages without further delay.

(Mrs) Bhupinder Kaur

China Trading and The World: by V. Vithal Babu, Deputy Director-General, Indian Institute of Foreign Trade.

The introduction describes the major developments in the Chinese economy from 1950 to 1976. It highlights progress in various sectors including agriculture and industry under Mao Tse-tung. It identifies the formidable problems facing Hua Kuo-feng and outlines future perspectives.

The Chapter on China's Foreign Trade Policy deals with elucidation and appraisal of objectives of China's economic and foreign trade policies on the basis of 'the principles of equality, mutual benefit and exchange of needed goods', 'independence and self-reliance' and 'modernisation and accelerated growth', under Chairman Mao. It dwells on recent developments in China's foreign trade policy with new interpretation of the concept of self-reliance (Zili gengsheng) under Chairman Hua Kuo-feng implying: 'Self-reliance does not mean that we advocate a closed door policy, but that we learn from the good experience and advanced science and technology of other countries and absorb them for our own use, discarding the dross and selecting the essential so as to develop things of our own, establish an independent, comprehensive modern industrial system and strengthen the material base of the dictatorship of the proletariat'.

Review of China's Foreign Trade and Prospects presents an analysis of recent trends in China's trade in respect of major products of import and export interest with special reference to its major trading partners, viz., Japan, Hong Kong, West Germany, U.K. and U.S.A., and Pakistan, especially between 1970 and 1976. It also projects estimates of trade by 1985.

This chapter on Trade Mechanics covers in detail the organisations concerned with foreign trade of China and their individual functions. It furnishes information about

Chinese Export Commodities Fairs, travel documentation and procedures and hotel assignments. It gives guidelines for approaching Chinese market, establishing contacts, and negotiating business. It contains information on tariff system, payment terms, trade marks, patents and copyrights.

The next Chapter narrates experiences of Japan, U.S.A. and U.K. in respect of trading with China and the next assesses the impact of China's trade on India's global exports in the coming years. It identifies potential items of importance for export and import.

Volume Two gives tables on Economic Results, 1949-76; Select Economic Indicators, 1952-75; China's Share in World Trade, 1970-76; Trade with Socialist and non-Socialist Economics, 1950-76; Composition of Imports, 1970-74; Percentage Pattern of Imports, 1970-74; Composition of China's Exports, 1970-74; Percentage Pattern of Exports, 1970-74; Sources of China's Imports, 1970-74; Percentage Pattern of Sources of Imports from Major Partners, 1970-76; Direction of Exports, 1970-76; Percentage Pattern of Direction of Exports to Major Partners, 1970-74; Twelve Major Trading Partners, 1970-76; Share in the Trade of Twelve Major Partners, 1970-75; Composition of Imports from Japan, 1970-74; Composition of Exports to Japan, 1970-74; Composition of Exports to Hong Kong, 1970-74; Composition of Imports from West Germany, 1970-74; Composition of Exports to West Germany, 1970-74; Composition of Imports from United States, 1970-75; Composition of Exports to United States, 1970-75; Composition of Imports from United Kingdom 1970-74; Composition of Exports to United Kingdom, 1970-74; Composition of Imports from Pakistan, 1970-74; Composition of Exports to Pakistan, 1970-74; Comparative Structure of Foreign Trade of India and China, 1970-75.

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NOTES and NEWS

- *Utilization of Mango Waste*
- *Some Basic Concepts on Food and other Industries for Rural Areas*
- *FPO—Approval of Labels*
- *Pahlavi Environment Prize*
- *Contribution to UNITAR*
- *IDA Credit*
- *Madhya Pradesh: IDA Credit*
- *Gujarat: Fisheries Project*
- *Seminar-Cum-Industry Clinic on Cherry and its products*

Utilization of Mango Waste

'The choicest fruit of Hindustan' is still the mango, as it was in the days of the poet Amir Khusrau, who sang its praises in the 14th century. Indeed, the mango has been a favourite fruit in India throughout recorded history, and is frequently mentioned in Sanskrit literature. The Chinese pilgrims who travelled here in the seventh century A.D., down to modern writers, have all mentioned it as most delicious fruit of India.

The mango is useful from the time the fruits are small and green until they are fully ripe. This is an advantage that it makes possible to use or sell the fruits which fall, but on the other hand, the crop must be guarded from trespassers during a long season. The best uses of fallen mangoes are in making *amchur*, powder, candied pulp, jam, paste, jelly, cheese, squash, chutney and pickles. Green mangoes are also used with milk and sugar to make a drink known as mangofool(Roy and Singh, 1952).

The total waste of mango fruit varies from 35 to 55 per cent, depending upon the variety and quality. The dried peels for processing is rather a problem. Seeds, which can be stored without deterioration, can find much wider use. The composition of mango seed kernel reveals that it is a rich source of protein (8.5 per cent), fat (8.85 per cent), carbohydrate (79.2 per cent), minerals (2.6 per cent), fibre (2 per cent), calcium (0.21 per cent) and phosphorus (0.21 per cent). Its fat and calcium contents are higher than those of cereals but the protein content is poorer than that of wheat, maize and barley. However, it compares favourably with that of rice. Kernel flour can be prepared by soaking the kernels overnight, grinding, washing with water to remove astringent taste and drying. It can be used either alone or mixed with wheat flour for making *puris*, *chapatis* and pudding etc. (Wilkins, 1942).

Source of starch

Mango kernel is a very good source of starch. It is estimated that over 1,40,000 tonnes of starch can be obtained annually from this source. It can find a use in textile, jute, paper and other industries.

The kernels are kept under water five to ten times its own volume with a small quantity of sulphur dioxide for about 24 hours. The water is drained off and kernels are crushed in stone grinders after one more washing with water. The process of washing with large quantity of water is repeated and strained through fine cloth. The strained water containing starch treated with sulphur dioxide is allowed to settle for six hours and the sediment separated by syphoning off the supernatant liquid. The pH of the sediment is adjusted between 10 and 11 and it is dried

and prepared in the usual way (Das and Banerjee, 1952).

As animal feed

The dried kernels with less than 10 per cent moisture has good prospect as fodder supplement because of balanced proportion of amino acids. Regarding its acceptability as fodder, biological tests with rats have confirmed that kernels could replace 60 per cent of wheat or maize in cattle ration (Kehar and Chanda, 1946).

Preparation of soap and medicine

Seed oil forms about 12 per cent of the weight of kernel, is another bye-product. It can be extracted by expellers or with solvents, and used in soaps and in medicine. The seed meal left after extraction can be used as cattle feed or as an organic manure (Hayes, 1970).

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Some Basic Concepts on Food and other Industries for Rural Areas

Any projection of food industries appropriate for rural areas must be based on a critical evaluation of the efforts made, and those continuing, with reference to the role of food science and technology.

Food conservation, food processing, and research and development (R and D) have formed the general basis of the technological approach to solve the problems of food and nutrition. The specific aims have been to check post-harvest storage and processing losses, to develop methods for quality amendments and improvements in common food materials, and to widen the scope of raw material resource utilization. No doubt, significant technological advances have been made in India in the fields of storage and processing of food materials, in the fields of product processing and development, and also in the fields of exploitation of unconventional raw materials (feeds as well as new sources) for extending food supplies and improving nutrition. In spite of remarkable achievements in these fields, we have in practice failed to solve the problems of food and nutrition of the common rural and urban populations.

Practical developments in application of science and technology for production and industry are determined by the nature and demands of the interests dominant on the economic scene. The prevalent factors guiding such application in India are private investment encouragement, market scope and the profit magnitude, under which the practical developments have necessarily gone along two broad lines. Technology-wise, the emphasis has been capital-intensive, modern sophisticated technology; while product-wise, the aim has been catering to the very small, but highly profitable local market of the few affluents for sophisticated consumer products, plus the export market. As a result, the industries particularly the food ones, which have been and are being set up, are largely in foreign capital and/or technological collaborations and usually operate at low capacity due to shortage of raw materials and/or demands. Glaring examples are vegetable dehydration plants, vegetable and fruit processing plants, seafoods and meat processing plants, and also the milk processing and products plants, etc. etc. The heavily publicised and promoted technology for proteins finds

most extensive application for exporting better quality protein concentrates of groundnut, etc., for feed uses elsewhere. For local food use in India, this technology is used very insignificantly for supporting welfare feeding programmes, which form no part of the normal production-economy of the country and which are largely dependent on foreign assistance and promotion. Thus our technological approach and the industries have not proved to be any assets to our efforts to slove the problems of food and nutrition.

Instead of futile efforts of fault-finding with, and presenting suggestions for technological and management or innovations and adjustments, we must look at the basic issues in the interest of the society as a whole. What should be the principle guidelines for technological and industrial approach in the area of food and nutrition? This question needs very serious attention. The details of technology and industry have to only follow from the basic guidelines. The two facets of the guidelines may comprise what should not be done and what should be done. For one, we may have to decide against transplant of technology and product approach to solve the problems of the poor masses in rural India from a know-all, benevolent attitude emanating from the centres of expertise in India, or really from those in the affluent world. For what should be done, the efforts have to be more comprehensive. On one hand, since the poverty is the main factor for the problem of food and nutrition, a scientific understanding of the socio-economic origins of poverty of the common people and the state of their malnutrition is necessary. On the other hand, a serious reorientation in our technological and industrial approach is needed along the following lines. Main objectives of industrial development in rural areas must be rapid generation of employment and of capital, and local reinvestment of that capital for building up pressures on land and rural society for increasing agricultural production; technology-wise, the emphasis has to be on developing that technology which ensures reliance on the local resources of materials, skills and small capital; and product-wise, the aim has to be production of mass consumer goods, coupled with all measures to ensure that the materials and products of mass consumption are not exported before local requirements are fully satisfied. Concisely, the basic guidelines are local self-sufficiency in food, and self-reliant economic development of the region and its people.

The above pattern and guidelines must be the determining factors for specific food industries appropriate for the particular rural areas concerned. That would also require a dispersion of the R and D personnel in the rural areas, their active involvement in the local problems to understand them and solve them in active collaboration with the local people, artisans and entrepreneurs. Only this way, the necessary struggles may begin against transplants from outside and against economic penetration of external forces of exploitation, as also may start positive programmes for the local development leading to the solution of problems of rural populations, including those for food and nutrition.

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FPO—Approval of Labels

The Director (F and VP), Department of Food, Ministry of Agriculture and Irrigation, Govt. of India, New Delhi, has informed that in future approval for labels for fruit products will be done by the Deputy Director (F and VP) of the region.

The Industry is advised to submit labels/designs/crown corks/closures requiring approval under clause B of the FPO in duplicate to the Regional Office. The Dy

Director will examine and approve the labels. Fruit products manufactured under FPO Licence should not be sold in the market without approval of label. The following guidelines are issued:

1. FPO mark of the stipulated design and size with licence number given on top or right side should be conspicuously displayed on the label by printing.
2. The net contents should be got conspicuously printed in kilograms/ml for each size of pack (In existing labels the words 'Net weight' should be amended to read as 'Net contents' in future reprints).
3. In case of synthetic products, the word 'Synthetic' should be printed in as bold letters as the name of the products and should precede the name of the product.
4. The pictures of only those fruits/vegetables should be displayed on the labels as are actually used in the manufacture of the product.
5. In the case of pickles, the medium of pack, i.e. in oil, brine or lime juice should invariably be suffixed to the name of the product.
6. In the case of canned fruits, the medium of pack, i.e. 'In Syrup' must be suffixed to the name of the product. Style of pack whether slices/halves/tid-bits should also be mentioned.
7. In the case of labels for Canned Fruits and Vegetables/Preserves/Murabbas, the minimum Drained Weight should be mentioned as per Packaged Commodities Regulation Act.
8. In the case of 'Synthetic Vinegar', the words 'Prepared from Acetic Acid' must be given on the label.

9 (*a*). In case of Processed Peas, the declaration 'Prepared from dried material' must be given.

9. In products like squashes which contain permitted colour and preservative, the declaration 'Contains Permitted Colour and Preservative' should be given.
10. All labels pertaining to products meant for export must conspicuously display the words 'Product of India'.
11. In the case of synthetic syrup/carbonated/non-carbonated beverages, the words 'contains no fruit juice' should be prominently and conspicuously displayed.
12. Any statement given on the labels which does not reflect the exact nature of the product or is in any way likely to misguide or confuse the consumer is not admissible. Statements like "tree ripened', 'garden fresh', 'freshly picked fruits' should not be given on the labels.
13. Statements like 'Rich in vitamins' must be supported by documentary evidence before these are allowed to be given on the labels.
14. Superlative adjectives like 'finest', 'best', 'topmost', 'choicest' will not be allowed to be used in the statements given on the labels.
15. All matter given on the labels should be got properly printed. Stamping of any matter or affixing of slips will not be allowed.
16. Ingredients in descending order of proportion should be mentioned on all labels of fruit products meant for export. Ingredients in this order should preferably be given on labels of fruit products for home consumption. It is mandatory to declare ingredients on labels of Vegetable Sauce,

mentioning percentage of each vegetable used.

Crown corks/closures for recyclable bottles which do not bear any label/printed matter:

1. Full name and address of the licensee should be given on the crown corks.
2. The matter printed on the crown corks should be clearly legible.
3. The FPO mark of the stipulated design with licence number given on the top or right side must be displayed on the crown corks.
4. In case of synthetic products, the words 'Synthetic' and 'contains no fruit juice' must be displayed on the crown corks.
5. The net contents must be mentioned on the crown corks.
6. In case any artificial flavour/permitted colour is used, the statement to this effect must be given.

Pahlavi Environment Prize

The Secretary-General of the United Nations, Dr Kurt Waldheim, has presented to M. Jacques-Yves Cousteau of France and Sir Peter Scott of the United Kingdom, the International Pahlavi Environment Prize for 1977.

The Prize, which includes an award of $ 50,000, donated by the Government of Iran through the United Nations, is to be given annually for the most outstanding contribution in the field of environment.

Thanks to his research and his explorations, Commandant Jacques-Yves Cousteau was one of the first persons to draw world attention to marine pollution By his oceanographic campaigns, aboard his famous ship 'La Calypso', and in writing, filming and speeches, he attracted the world's attention on the necessity of preserving our underwater resources. As Director of the Monaco Oceanographic Museum, the initiator of the 'Precontinent' Diving Programme, the Secretary-General of the International Commission for Scientific Exploration of the Mediterranean, and member of the French Prime Minister's 'High Committee for Environmental Matters', Commandant Cousteau has brought and is still bringing invaluable contribution to the preservation of our environment.

Sir Peter Scott devoted his life to the preservation of our environment. Great ornithologist, author, painter, illustrator and broadcaster, Sir Peter Scott has made invaluable impact on many for the preservation of the World's wildlife. Founder of the World Wildlife Fund, among many other distinguished and important conservation activities, Sir Peter Scott has done much for the preservation of our natural heritage.

Contribution to UNITAR

India has contributed $ 75,000 to the United Nations Institute for Training and Research (UNITAR) for 1977.

UNITAR, which trains officials for international co-operation work and studies a range of problems of direct concern to the United Nations and the international community, is financed by voluntary contributions from states, foundations and individuals.

IDA Credit

A million farmers in India will benefit from an agricultural project being supported by a credit of US $ 200 million from the International Development Association (IDA), an affiliate of the World Bank.

The IDA credit will support the Agricultural Refinance and Development Corporation's (ARDC) on-farm investment programme over a two-year period involving a total of US $ 583 million. At full

development in 1984, the project is expected to result in annual incremental production valued at US $ 367 million a year.

The IDA Credit will assist in providing loans to farmers for on-farm development purposes, mainly minor irrigation, but also for development of tree crops, dairy and poultry, sericulture, fisheries and several other agricultural activities. About US $ 100 million of the credit will be reserved for small farmers who will qualify for preferential borrowing terms provided their income was adequate to repay the loan over a prescribed period. About 175 million mandays of additional employment will be generated.

Madhya Pradesh: IDA Credit

Agricultural Extension and Research in India's Madhya Pradesh State will be strengthened with the assistance of a credit of $ 13 million from the International Development Association (IDA), an affiliate of the World Bank.

The $ 20.9 million project is directed towards achieving, in the short term, sustained growth in agricultural output, particularly foodgrains in 15 of the 45 administrative districts of Madhya Pradesh covering about 7 million hectares of cropped land.

The project will emphasize the consolidation and strenghtening of the State's Agricultural Extension Services and help reorient adaptive agricultural research to provide farmers, on a regular systematic basis, with advice on farming practices having an immediate impact on yields. The project will be executed over a five-year period.

Gujarat: Fisheries Project

The World Bank and its affiliate, the International Development Association (IDA), are providing $ 18 million for a project designed to increase fisheries production in India's Gujarat State. IDA is extending a credit of $ 14 million on 'Third Window' terms.

Seminar-Cum-Industry Clinic on Cherry and its products

The Small Industries Service Institute, Srinagar, in collaboration with Regional Research Laboratory, Jammu, and State Department of Horticulture, organised a seminar-cum-industry clinic on cherry fruit and its products at Regional Research Laboratory, Srinagar, on 24th—25th June 1977.

The Seminar was inaugurated by Shri S. L. Katyal, Assistant Director-General (Horticulture), Indian Council of Agricultural Research, Government of India, New Delhi and presided over by Dr J. S. Pruthi, Head and Project Co-ordinator, CFTRI Experiment Station, Ludhiana. The proceedings of the Seminar were spread over three sessions.

Technical Session—I

Horticulture

Chairman: Shri S. L. Katyal, Asst. Director-General (Hort), Indian Council of Agricultural Research, New Delhi.

Reporter: Shri K. L. Kabu, Horticulturist, Fruit Research Station, Shalimar, Srinagar.

Summary and Recommendations

1. Cherry culture has remained restricted to the J and K State. The fruit could be tried along the foot hills of Himalayas from the North-Western end to the North-Eastern end. Within the state of J and K, cherry culture needs to be intensified.

   A survey be undertaken to find out the suitable places where the fruit could be grown.

2. Germplasm of 77 cherry varieties is available in the country in different research stations. An attempt should be made to describe the varieties. It was reported that the publication of monograph on cherry is in hand with the State Department of Horticulture.
3. Guidelines for control of disease in cherry plants need to be worked out for benefit of the farmers.
4. (*a*) Increase period of cherry availability by introducing varieties with maturity spread over longer extremes.

   (*b*) Find out an early and better quality as compared to Awal Number (Early Purple Black Heart).

TECHNICAL SESSION—II

POST-HARVEST TECHNOLOGY, PROCESSING, PACKAGING AND MARKETING

Chairman: Dr J. S. Pruthi, Project Co-ordinator and Head, Central Food Technological Research Institute Experiment Station, Gill Road, Ludhiana.

Reporter: Shri A. K. Bhatia, Scientist, Regional Research Laboratory, Jammu.

Recommendations

1. Suitable arrangements for cold storage at Srinagar and at the destination have to be ensured in view of the highly perishable and fragile nature of fresh fruits.
2. Efforts be made to enhance the shelf-life of fresh cherries by way of in-package fumigation, hydro-cooling and modified controlled atmosphere.
3. Optimum harvest times or maturity indices of different varieties of cherries be determined.
4. There is a need to assess the comparative composition and nutritive value of different varieties of cherries and their suitability for processing.
5. Development and diversification of cherry products should be undertaken on products like cherry juice, nectar, fermented beverages, preserved, glaced and crystallised cherries as well as pickles from wild cherries.
6. The processing techniques developed/standardised by the Regional Research Laboratory, Jammu, be given publicity among the user organisations.

TECHNICAL SESSION—III

PROBLEMS OF THE FRUIT PRESERVATION INDUSTRY

Chairman: Dr R. L. Dang, Chairman, Fruit Technology Division, Regional Research Laboratory, Jammu.

Reporter: Shri H. L. Kaul, Manager-cum-Chemist, Community Canning Centre, J and K Government, Srinagar.

Recommendations

1. The industry desired that the fees levied by Regional Research Laboratory, Jammu, may not be charged. Joint problems of industry should be referred to Director, Regional Research Laboratory, Jammu, and Research and Development Committee.
2. There is an urgent need for alignment of Fruit Products Order and Defence specifications with special reference to drained weight and cut-out brix of syrup in canned cherry.

3. Regional Research Laboratory may work and furnish detailed suggestions for retaining of natural flavour in canned cherry.

4. The process developed by Regional Research Laboratory for the manufacture of cherry preserve from bulk stored cherry may be further modified to preserve cherry in 30°brix syrup instead of 72°brix.

5. The indigenous cherrypitter used in Regional Research Laboratory, Jammu, has been found to be unsatisfactory. Modification of cherrypitter is essential. To facilitate early solution, only one model unit of cherrypitter may be imported for trial and modification of the indigenous cherrypitter.

6. The local canners in general are ignorant about the developments made in the field of fruit technology in other developed countries specially of temperate zone. It is recommended that a team comprising of representatives of industry, horticulture, Small Industries Service Institute, Regional Research Laboratory, and Quality Control enforcement authority (FPO) may be deputed.

Wanted Second-hand Complete Set of
Machinery for Producing Mango Pulp and Juice
Kindly Contact with Lowest Price

SHRI G. RAJAGOPAL
15 Viswanatha Mudaly Street
TIRUPATTUR
North Arcot District, Tamil Nadu

Export News

- *Registration of Export House*
- *Trade Concessions for Tropical Products*
- *Blanket Foreign Exchange*
- *Freight Rates*
- *The Netherlands—ROKA 1978*
- *Singapore—Food Processing*
- *Pakistan—Livestock Project*
  Shipping

Registration of Export House

The scheme pertaining to Export Houses has been revised so as to make it simpler in actual operation and more conducive to the fulfilment of the objectives underlying the scheme.

The minimum export performance for the grant of Export House Certificate has been increased from Rs 5 million to Rs 10 million in respect of select export products and from Rs 30 million to Rs 50 million in the case of other products.

The interests of the small scale sector have been maintained and the increase in the minimum limit of export performance will not apply to small scale manufacturers and consortium of small scale units. The limit of Rs 2.5 million in respect of select export products and Rs 30 million in respect of other products will continue unchanged.

A provision has also been made that export houses, who export products made by small scale units, will be given a greater weightage as compared to their exports of other products. The value of exports made by an export house in respect of small scale units will be taken at double the actual value for the purpose of computing the exports for the grant of Export House Certificate, initial and supplementary initial licences to export houses, for the discharge of export obligation imposed on export houses and for determining REP licence by export houses. This encouragement to export houses will provide the necessary incentive to promote exports of products manufactured in the small scale sector.

A consortium of small scale units is recognised as an export house if the total exports of its member-units are of the order of Rs 2.5 million in respect of select export products. If it is difficult for the small scale units to arrange for the setting up of a consortium of this level, such units can form export groups of their own provided the total value of exports of the products of such export groups is not less than Rs 1 million. These export groups will be given some of the advantages available to export houses. It will also be a condition that the export group will have to undertake to increase the export performance of its member-units by a minimum of Rs 5 lakh each year so that in a period of three years it can become a full-fledged export house.

If the export group of SSI units having an export turnover of Rs 1 million has exported the products of cottage and village industries, such export group will be given all facilities which are available to full-fledged export houses. This step has been taken to promoting the interests of cottage and village industries and to assist in the matter of marketing their products.

The quantitative export performance will not be the only criterion to decide the eligibility of an exporter to become an export house. Other factors include assistance rendered by the export house to small

scale units in the matter of improvement of quality, marketing of goods and financial assistance, the relationship maintained by the export house with its supporting manufacturers in the matter of exporting their products, allocation of imported raw materials and giving them other assistance. Apart from these considerations, the structure of the export house, its development programmes, its entry into new market and introduction of new goods in the traditional markets will be taken into consideration while recognising export houses.

In the scheme of export houses as in force upto 31st March 1977, 12 product groups were specified. The main purpose of specifying these product groups was to confine the export houses to the import of items available in the shopping lists in these product groups only. Since the shopping lists have been removed, these product groups have also been removed from the scheme of export houses in the new policy. The removal of these product groups will make the scheme more broad-based. The export houses will be able to import against their licences any items of raw materials, components, packing materials and consumable stores subject to the same restrictions as would apply to other exporters in the matter of importing banned and restricted items and the items appearing in the export linked-import list.

Export houses will be given foreign exchange for promotional activities. The amount of foreign exchange released to each export house will be equal to 2.5 per cent of the f.o.b. value of its total exports in the previous year. The export house will be allowed to spend this foreign exchange for specified activities connected with export promotion such as expenditure on sales-cum-study team abroad, participation in exhibitions abroad, advertisement of goods in foreign markets and for the import of testing equipment for setting up common servicing centres. Out of this foreign exchange, any amount exceeding Rs 1.0 lakh will be set off against the import entitlements earned by the export house on its own exports.

Export houses will continue to have the facility to import garment-making machinery, machinery required for leather industry, testing instruments and equipment, and equipment for packing and tagging against their REP entitlements.

Export houses will be allowed to acquire REP licences by transfer from other exporters for a value up to 25 per cent of the f.o.b. value of exports in the previous year. This will be subject to an export obligation which will be equal to four times the value of acquired licences. In discharge of this export obligation, the export houses will have to export goods covered by the list of select export products.

Trade Concessions for Tropical Products

The GATT announced on 30 December 1976 that trade concessions and contributions on tropical products by Australia, the European Economic Community, Finland, Norway, Sweden, New Zealand and Switzerland would enter into effect from 1 January 1977, while those of Austria, Canada and Japan were to be put into effect as soon as the necessary domestic procedures could be completed. These were described as the 'first concrete results' of the multilateral trade negotiations (MTN), which were officially opened in September 1973 with the adoption of the 'Tokyo Declaration'. The 'concessions and contributions' mainly took the form of tariff reductions either on a most-favoured-nation basis or as improvements in the Generalised System of Preferences. Commitments of a very limited nature were made in respect of non-tariff measures

such as quantitative restrictions and internal taxes.

The Tokyo Declaration recognised tropical products as a 'special and priority' sector and the participants in the MTN had aimed at an early agreement in this area. These recent actions are the result of tropical product negotiations carried out through a specialised negotiating group set up for this sector.

Although these results have not gone through the legal procedures, such as the signing of a protocol or declaration, normally required for them to be regarded as official, details of the resulting tariff rates have been made public in the countries concerned for purposes of customs and trade control administration. On the basis of the data thus available the technical services of UNCTAD have made a preliminary analysis of their effects in terms of trade volumes covered.

The offers of the EEC and the nine other countries cover 840 products, or tariff lines, relating approximately to $ 5.6 billion of imports from developing countries of which $ 5 billion is accounted for by the EEC offers (In the EEC offer, a 30 per cent reduction in the MFN tariff on coffee affects a trade of $ 1.6 billion). Only $ 1.3 billion would benefit from duty-free offers, either under MFN or GSP, and the remainder of the offers involve tariff reductions of from 20 to 60 per cent.

Many products are included in the offers of more than one developed country; seven developed countries gave concessions on fish, fresh and prepared; vegetables, fruits and nuts, fresh and prepared; spices; coffee, raw and processed and processed cocoa; although these offers are far from fully meeting the requests on the part of developing countries.

Many requests for tariff reduction on products subject to widespread tariff protection were ignored in the offers by the majority of countries, and these include honey, sugar and confectionery, molasses, vegetable saps and extracts, oils and fats, tobacco, fruits provisionally preserved, alcoholic beverages.

Despite several offers the following products will remain substantially dutiable in the ten markets: processed cocoa, chocolate products, spices, sauces, vegetables, (fresh and prepared), cut flowers, coffee, prepared fruits, wood articles and carpets.

Developing countries are generally critical of the scope and content of the offers and are concerned over differences of interpretation of the concept of non-reciprocity which, as provided for in the Tokyo Declaration, was to be the guiding principle for negotiations between developing and developed countries. Developing countries have stated that they consider this present implementation of offers to constitute only a first stage and are keeping open possibilities for seeking improvements, as well as taking into consideration progress elsewhere in the MTN in areas such as tariffs and technical barriers to trade and other non-tariff measures relevant to trade in tropical products.

The negotiations on tropical products in the MTN can be regarded as an exercise complementary to that being undertaken in UNCTAD under the Integrated Programme for Commodities in pursuance of UNCTAD resolution 93 (IV). The Integrated Programme is aimed at an improvement of the basic market structure of trade in commodities, and includes many which fall into the category of tropical products. One of the objectives of the Programme is to seek to improve market access for primary products and the processed products thereof.

Blanket Foreign Exchange

Blanket release of exchange is made by the Reserve Bank under the scheme of

liberalised Blanket Foreign Exchange permits for travel abroad for export promotion. The permit holders, while booking passage, should draw the required exchange for meeting the expenses abroad. It is not permissible to accept any offer of hospitality from overseas parties under the exchange control rules, without the prior permission of the Reserve Bank. In case exchange is not proposed to be drawn, RBI's approval on P form for booking of passage will have to be taken after submitting evidence of the hospitality which is sought to be accepted.

Exporters holding such permits have been given the freedom to depute abroad on export promotion grounds, any of their employees or consultants directly associated with export promotion, without reference to the Reserve Bank, and to draw exchange at prescribed scales for meeting their expenses abroad.

Any lapse on this score is likely to result in withdrawal of the facility and imposition of other penalties as may be appropriate.

Freight Rates

The Ceylon/Continental Conference have introduced a general freight increase of 12.5 per cent on all commodities from 1.4.1977. The Ceylon/UK Eire Conference have effected a similar increase of 15 per cent from the same date.

Bahrain has cut the waiting time at Mina, Sulmal to 18 days from that of 30 days. The handling charge has increased by 25 per cent. The U.S. shipping lines have decreased their congestion surcharge from 13 to 25 per cent, following a similar action by U.K.—Arabian and Iranian Ports Conferences.

THE NETHERLANDS: ROKA 1978

The 21st International Food Exhibition will be held from Monday 13th to Friday 17th February 1978. The fair is organised by Royal Netherlands Industries, Fair, Utrecht, in collaboration with Foundation Food Fair—ROKA.

ROKA—78 will exhibit foodstuffs, beverages, non-food products and technical fittings. Exhibitors are free to choose their own architecture and stand construction. The fair stand construction department will assist in the construction and equipping of the stand. Messrs Van, Gend and Loos are the official forwarding agents who will look to the formalities concerned with imports, exports and transport of exhibits.

The Centre for Promotion of Imports from Developing Countries (CPI), Netherland Ministry of Foreign Affairs, gives assistance to exporters from developing countries to participate in the trade affairs, with a view to introduce their products in their markets. The CPI assistance is in the form of rental of stand space, construction of stand including display cost, daily cleaning; transport cost of the exhibits in Netherlands including custom clearance and packing and repacking; 50 per cent return flight ticket for one representative of participant organisation and contribution towards hotel cost.

For participation under CPI assistance write to Head of the Trade and Industry Promotion Section, The Centre for Promotion of Import from Developing Countries (CPI), Coolsingel 58, Rotterdam, The Netherlands.

SINGAPORE: Food Processing

Singapore has a large population of Pigs and Poultry compared to any other country in the world. On an average there are thirteen chickens for every person and a pig for every two. Most of the other food is imported and processed. There are food

processing industries which are canning western type food; Chinese run companies specialised in Asian tastes, and local firms packing traditional Asian foods. Raw materials like beef, lamb, milk powder required for processing come from Australia, New Zealand, Holland and other countries cold storage is the oldest and biggest food processer, manufacturing products such as ham, bacon, fresh and frozen sausages. Their factories are situated in Singapore, Malaysia, Australia, Indonesia, Thailand, Hong Kong and Seychelles. Ben and Company is engaged in import/export of frozen and fresh fruits and manufacture of edible oils, ghee, margarines and soaps. The Chinese organisations manufacture noodles, bread, cakes, sauces, snack foods, mostly for local catering.

The food processing and manufacturing industry plays an important role in the economy of Singapore. There are over 200 companies engaged in the manufacture of a wide range of food products. The frozen food business is well established and frozen chicken tops the list in quantity consumed. The annual consumption is about 11,000 tonnes compared to about 5,500 tonnes of beef.

PAKISTAN: Live Stock Project

The International Bank for Reconstruction and Developments (IBRD) have extended a loan of US $ 10 million for Punjab Live Stock Project. The project will be executed by Punjab Live Stock, Dairy and Poultry Development Board. The project includes processing and transport equipment for the slaughterhouse, dairy plant equipment for the university and construction of slaughterhouse.

More details for participation please write to Shri P. K. Malhotra, Ministry of Finance, Department of Economic Affairs, Government of India, New Delhi or Indian Embassy, Islamabad.

Shipping

With the merger of private shipping organisations in the National Shipping Corporation (NSC of Pakistan), the company is gradually increasing its fleet. At present NSC operated on four main routes linking Pakistan with the North America, U.K., Europe, the Far East and Bangladesh.

Foreign News

- *U.K.—Computer Printing Technique*
- *U.S.A.—Container Leak Tester*
  Centrifugal Deaerator
- *Australia—Prefabricated Cold Storage Units*
  Bread Dough
  Lobster and Prawns
  Cold Storage System
  Citrus Juice
  Refrigeration for Commercial Purposes
- *West Germany—Partner for Progress*
  IKOFA-78
- *Switzerland—International Tea Promotion Association*
- *Thailand—ESCAP Annual Session*
- *Rome—World Food Programme Aid*
- *Holland—Naarden International and Shell Internationale*
- *Ethiopia—Trade Development*
- *UNIDO—Industrial Training Programme*
  Industrial Redeployment

U.K.

Computer Printing Technique

A new alpha-numeric printing/coding module, developed by Helix Materials and Systems Ltd., 545 Ipswich Road, Slough, Berkshire SL1 4EN, England, for use with their Helix-Aire 23 high-speed labelling systems (Fig. 1), enables information such as stock codes, prices and product descriptions to be printed onto labels at rates up to 150 characters per second or 900 labels a minute. This is over four times faster than conventional hot-foil or ink printing techniques. A computer printout head creates the characters on a moving web of die-cut labels just prior to application. Information to be printed is inserted in standard telex code into a small electronic memory, normally by use of a pocket programmer. The memory, housed in the labelling-machine control box, has a capacity of 32 or 64 characters.

Helix-Aire 23 systems (Fig. 2) use self-adhesvie labels supplied on a backing roll. The labels are applied to the product by air jets, triggered by photoelectric sensors. Since no part of the applicator need touch the product, the system can operate at any angle with product flow in either direction, applying labels onto packs of irregular height or even into deep recesses. The standard machine can place labels measuring from $\frac{1}{2}$ in. $\times\frac{1}{2}$ in. to 3 in. $\times$5 in. (from 12$\times$12 to 75$\times$125 mm) at speeds upto 1500 linear inches (38 000 mm) of label web per minute with placement accuracy of $\pm$1/32 in. (1 $\pm$mm).

AIR BLAST

Following optional overprinting, labels are peeled from the web by passing it round an acute-angled bar. The detached label slides across the perforated front of an air-box and is held by a light vacuum created by an extractor fan. As the product approaches the label, a photoelectric sensor or microswitch on the conveyor sends a trigger signal to the control unit. After an adjustable time delay a blast of compressed air is applied to tubes push-fitted into selected perforations behind the label (Fig. 3). Overcoming the holding vacuum, the air blast projects the label onto the product through a distance of up to 1 inch (25mm). The next label then advances into position, controlled by a photoelectric sensor which scans the moving web and detects the 1/8 in. (3 mm) gap between labels.

The air-blast tubes are connected by flexible tubing to the compressed-air source. This facilitates changeover for new label sizes and allows special configur-

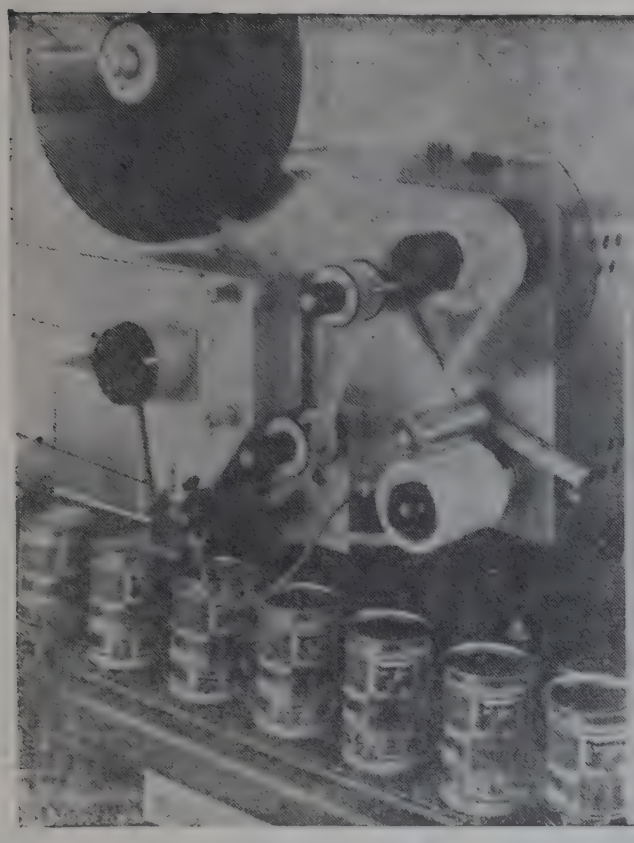

FIG. 1. Helix-Aire 23 high-speed labelling system fitted with alpha-numeric printing/coding module (arrowed)

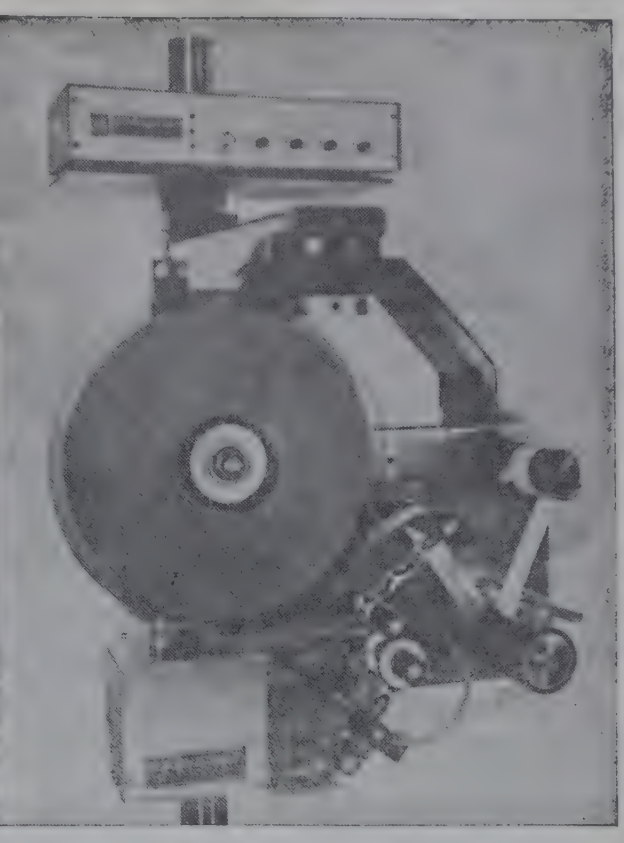

FIG. 2. The basic Helix-Aire 23 labelling system, showing control box (top) and airbox (bottom)

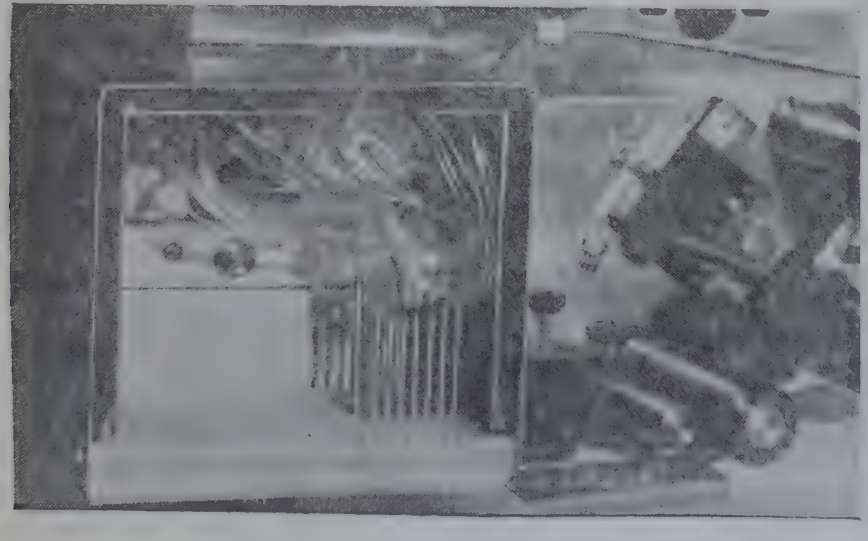

FIG. 3. Airbox with front plate removed to show perforations and movable air-blast tubes

ations to be constructed. For example, to apply labels to the shoulders of whisky bottles, the main air blast attaches the centre of the label, and a moment later, a separate, sequenced air blast transmitted through two protruding tubes sticks down the two ends.

SEVEN PINS

The printing head of the alpha-numeric module consists of a line of seven solenoid-operated pins firing in synchrony with the moving labels to create a single line of characters (Fig. 4). Each character is formed from a 7×5 matrix of dots. Rib-

FIG. 4. Typical label

bon transport systems for ordinary inked ribbon and one-time carbon ribbon are available, or the head, used without an intervening ribbon, can emboss plastic or metal-foil labels directly. Two or more print heads may be mounted in parallel.

The pocket programmer (Fig. 5) is available with plug-in character fonts for most languages, or may be replaced by data input from a computer or a teletype keyboard. Once programming is complete, the input device may be disconnected to prevent tampering. Apart from printing repeated information, sequential numbering of products is possible, triggered by a counter on the product line.

MODULAR SYSTEM

The Helix-Aire 23 forms the basis of a modular high-speed labelling system adaptable to many requirements. Mounted on an optional T-stand, the machine can be easily moved between production lines and adjusted for height and angle. Reliability is proven by over 10000 units currently operational, mostly in North America. Options available include the 'Jumbo' head, comprising oversize airbox, peeler bar and rollers, for applying labels up to 5 in. wide by 7 in. long (125 × 175 mm). Alternatively, large labels can be applied by substituting a spring-loaded touch-applicator head for the airbox. Printing options include conventional hot-foil and ink printers suitable for speeds upto 200 labels/min, as well as the new alpha-numeric module.

Helix 'Rapide' labelling machines consist of the Helix-Aire 23 mounted on a heavy-duty frame which can also incorporate belt or slat conveyors, scroll or star-wheel infeed, top stabilisers, and partial or full wrap-around. The machines can label all bottles

FIG. 5. Pocket programmer

or glass or plastic containers up to quart size (1. 1 litre).

Helix can also supply rolls of self-adhesive labels printed by flexography, gravure or letterpress.

U.S.A.

Container Leak Tester

Borden Inc. Can and Machinery Operations, Center Street, Randolph, New York-14772, have produced Container Leak Tester (Model 550) for a wide range of sizes and shapes in metal, glass and plastic.

The Borden Model 550 Tester is a manually operated machine designed to automatically test containers with air pressure as the test chambers rotate. Chambers are capable of testing for leaks as low as 1cc in 10 seconds @ 90 psi at 6.1 atmospheres. In start-stop operation, each test chamber stops automatically at the operator's station until the container has been removed, another inserted and the start button depressed. In continuous operation, the test chambers rotate, permitting the operator to easily remove and insert containers as the chambers pass his station. In either mode of operation, a warning light alerts the operator when a leaking container is detected. The number of containers tested per minute is determined by the speed of the operator, normally 15 per minute in stop-start and 20-30 in continuous operation.

Centrifugal Deaerator

James Dole Corporation, 1400 Industrial Way, Redwood City, California-94063, have produced centrifugal deaerator to remove entrained air from viscous and non-viscous products at up to 40 gallons per minute.

The Centrifugal Deaerator consists of a vacuum chamber approximately 30 inches in diameter containing a single rotor, which is driven by a vertical motor mounted below the vacuum chamber. The product enters the inlet tube, passes through the air separator and is projected onward through a series of impingement rings to the wall of the chamber. The product thus deaerated flows down the wall and is withdrawn through the outlet at the bottom of the chamber.

The Deaerating Rotor consists of a central air separator and distributing reservoir, and a series of concentric impingement rings or baffles constructed of perforated sheet metal.

Large bubbles of air are removed by the centrifugal air separator. The product containing occluded and dissolved air then passes successively through the perforated impingement rings. At each ring rotational motion is imparted to the product, producing centrifugal force which impels it through the perforations in the form of very fine droplets which impinge on the next rings. Upon striking the succeeding rings the droplets coalesce and are accelerated again, repeating the process described above. When the product leaves the outermost ring it travels at high speed in the form of a mist or very fine spray until it strikes the chamber wall. Under high vacuum the droplets are not slowed by air friction, and strike the wall at high velocity, thus accumulating in a layer of liquid which drains continuously to the bottom of the chamber. Therefore, very little, if any, product is carried out by mechanical entrainment of droplets in the vacuum line.

The repeated formation and impingement of the droplets allow the dissolved or occluded air in the product to diffuse into the vacuum and be carried away.

AUSTRALIA

Prefabricated Cold Storage Units

Coolrooms and freezers for all commercial purposes are supplied by Producer Manufacturers Pty. Ltd., P. O. Box 278, Mount Hawthorn, Western Australia 6061, as prefabricated panels which can be assembled quickly, and easily enlarged or relocated.

The units are used in abattoirs for storage of fish, vegetables and fruit, and in food and beverage retailing.

They range in size from 7 cu m (247 cu ft) to 30,000 cu m (1,059,440 cu ft), or larger, and are of any length or width. Height ranges from 1.8m (6ft) to 20m (65 ft).

The panels are made by a process that extrudes lightweight, metal-clad panels of any thickness between 50 mm (2 in.) and 300 mm (11.8 in.).

Panels are insulated with self-extinguishing polystyrene and can be used to ensure temperatures as low as minus 40 deg C (minus 40 deg F).

The company supplies ancillary coolroom equipment and fitting including power-operated doors, automatic air pressure relief ports, air curtains, access and loading hatches, shelving and meat hanging rails.

It will supply working drawings and specifications in close liaison with clients.

Architects, engineers and industrial designers are offered special services including preparation of estimates, sketch plans, preparation of insulation and refrigeration specifications, and preparation of working drawings and tender documents.

The company also supplies small domestic coolrooms.

Bread Dough

Frozen bread dough which can be baked quickly and easily into hot, crusty bread is made by a subsidiary company of William Jackett and Son Pty. Ltd., P. O. Box 101, Port Adelaide, South Australia 5015.

Marketed under the 'Bakehouse' brand, the dough is specially formulated from high protein flour, yeast and other natural ingredients to give an old style, home-baked flavour.

Hygienically wrapped in 1 kg (2.2 lb) packages with two 500 g (1.1 lb) pieces to each packet, the dough can be stored safely and conveniently in most home freezers and used as needed.

It is available in either white or wholemeal.

The formula for the dough was developed by the company after nine months' experimentation.

Once mixed and moulded into its final shape, it is 'snap' frozen at minus 60 deg C, (minus 76 deg F) by an efficient CO_2 gas method to halt the natural 'proving' or rising process.

It is then packaged and stored in a holding room at minus 15 deg C (5 deg F) until required for shipment. It is essential the dough remains at this temperature or less until used.

To prepare the bread, the dough is taken out of the freezer and placed in a baking tin to thaw and 'prove'. It is allowed to ripen naturally and is not chemically induced as in commercial processes.

During the 'proving' process the mixture expands to twice its size. It is then placed in a pre-heated oven for about 30 minutes, or until it is golden brown.

For a Continental-type loaf the dough can be baked on a greased, flat oven tray. The mixture can also be separated when soft into about six pieces to make rolls.

The convenient, prepared dough mixture eliminates messy hand-making of dough and ensures premium, tasty bread with little effort.

The dough is packed in twist-tied polythene bags with printed instructions. There are 12 packets to the carton.

The company is one of Australia's oldest established flour millers. It has combined with its modern bread bakery to make this product for local and overseas markets.

Lobster and Prawns

Rock lobster is available as fresh frozen tails or in fresh frozen whole cooked form from Seafarer Industries Pty. Ltd., 12 Mews Road, Fremantle, Western Australia 6160.

The product is processed while still alive, ensuring the highest quality. The company also processes prawns, and supplies markets in the U.S.A., Japan and Europe.

Four species of prawns are available: Tiger, King, White and Endeavour, in three forms—fresh frozen whole green (raw), fresh frozen raw headless shell-on, and fresh frozen whole cooked.

Lobster tails are graded in seven categories from A to G. For example, A grade tails are 142 to 170 g (5 to 6 oz) net weight each , and G tails weigh 567 g (20 oz) each.

The tails are exported in 11.34 kg (25 lb) cartons, whole cooked lobster is exported in 10 kg (22 lb) cartons.

Prawns are graded in approximate counts to a 1 kg pack: under 15 prawns, 16 to 20 prawns, 21 to 25 prawns, 26 to 30 prawns, 31 to 35 prawns, 36 to 40 prawns, and 41 or more prawns.

The counts in imperial one-pound weight are: under 8 to 10 prawns, 11 to 15, 16 to 20, 21 to 25, 26 to 30, 31 to 35, 36 to 40, and 41 to 44.

Prawns are sold in 4.4 lb (2 kg) frozen blocks.

Whole cooked prawns are in cartons containing 10 individual packs each weighing 1 kg (2.2 lb).

Health officers of the Australian Department of Primary Industry have sole control over the acceptance of products for export. This close scrutiny ensures that only top quality lobster and prawns are sent overseas.

Cold Storage System

A cold storage system developed by Food Handling Constructions Pty. Ltd., 560 Whitehorse Road, Surrey Hills, Victoria, Australia 3127, provides a comprehensive, controlled temperature cold storage facility suitable for tropic arid and tropic humid areas.

It is marketed under the trade-name 'Tempak', and has been used in the construction of a number of facilities in the Middle East and South-East Asia.

Each element of the system, refrigeration, insulated panels, structure and electrical, is an integral component of the overall complex and the individual sections complement each other to provide maximum efficiency at low cost.

The refrigeration package units require no water, being designed for air cooled operation in ambient temperatures up to 46 deg C (115 deg F). These units can be provided for dual temperature operation suitable for chiller and/or freezer storage.

With all components factory-built and tested on-site, commissioning time is short. A typical 400-tonne complex takes about 12 days to assemble and commission.

These standard minor systems are offered —400, 600 and 1200 tonnes and major systems in 2500 tonne modules, depending on customer specifications and requirements.

The range of storage temperatures available are from—30 deg C to 10 deg C (—22 deg F to 50 deg F), providing for storage of foods such as meat, fish, eggs, dairy products, vegetables and fruits under the best possible conditions.

Depending on the size of the facility, the storage area is divided into several

compartments and the administrative office and workshop are provided as optional extras.

The system is provided with its own diesel electric generator for stand-by or prime power source.

In addition, an automatic ice-making plant can be included in the complex if required.

As part of its follow-up service, the company provides expertise and supervision to commissioning stage and can train local staff in all aspects of food storage, handling and administration.

Citrus Juice

Citrus juice for retail or industrial markets is produced and packed by Berri Fruit Juices Co-operative Ltd., P. O. Box 296, Berri, South Australia 5343, in the heart of South Australia's major fruit producing area.

The location of the factory ensures that no time is lost between picking and processing, thereby retaining the correct acid/sugar balance.

Modern plant enables the company to handle seasonal production exactly when it is ready for processing, and strict quality control, combined with high standards set by the Australian Government for handling food for export, ensure that only first quality produce is sold.

The company's main product is orange juice. It is packed for retail in vacuum-sealed cans from 250 ml (8.8 fl oz) to three litres (105.6 fl oz), and is available also as concentrate in cans of the same capacities.

The concentrate is diluted with water to give a pure fruit product.

The company produces concentrated fruit juices in various strengths for the industrial market, and these are available either frozen or with preservative added.

Industrial concentrates for preparing fruit juices, soft drinks or cordials and for the food industry, generally, are packed to suit buyers.

Pieces, pulp and purees are available to meet a growing demand by manufacturers of yoghurt and other milk products.

The company also processes tomatoes, peaches, apricots and grapes, and packs them for retail or industry.

Other products include citrus peel in various mixes (a 60-40 orange/lemon mixture is said to be very popular) and shredded peel for jam making. Peel is diced into 5 mm (0.2 in.) pieces and packed in polythene-lined cartons of 15 kg (33 lb) net, or as required. Diced candied peel and essential oils also are available.

Refrigeration for Commercial Purposes

Refrigerators and cooling system for many specialised and general purposes are supplied by Metric Commercial Appliances Pty. Ltd., 27 Chifley Street, Smithfield, New South Wales, Australia 2164, and range from drinking water units to mortuary cabinets.

The company's products include retail display and storage refrigerators.

Water coolers, either free-standing or flush mounting, operate automatically and supply 27 litres (6 gal) of water an hour at a constant temperature of 10 deg C (50 deg F), regardless of ambient or mains water temperatures.

The water is delivered from a bubbler or cup filler. A hermetically sealed system refrigerates the water.

Domestic freezers with baked enamel or stainless steel interior and baked enamel exterior finish are powered by a sealed unit.

Temperature is adjustable and all models have a fast-freeze switch. Sizes are: 240 litres (8 cu ft), 340 litres (12 cu ft), and 690 litres (24 cu ft).

Maximum food storage space is provided and sliding baskets give easy access. The company makes single-door, two-door and three-door upright storage and display refrigerators with capacities ranging from 340 litres (12 cu ft) to 1700 litres (63 cu ft).

They are powered by a sealed system with temperature control from 2 deg C (35 deg F) to minus 15 deg C (5 deg F), and are used for general storage and display, and bottle storage.

Horizontal storage refrigerators are available with two or three doors for storing small goods, dairy products, wine, cheese and other perishables.

Larger units can include a servery line refrigerator for short-term storage of prepared food, refrigerated display, ice-cream storage and hot food storage.

Standard or custom-built models are designed for retailers, canteens, restaurants and clubs.

Mortuary cabinets have single, two, three or four berths and are equipped with stainless steel stretchers. Refrigeration is by coils.

Other products include medical storage refrigerators for blood and frozen plasma. They comprise three upright and four chest-type cabinets which include one for storing small quantities of blood and which is suitable for private hospitals, operating theatres or intensive care wards.

All medical cabinets conform to international standards and are tested under exacting conditions, including those experienced in tropical areas.

The medical units are in capacities from 100 to 1020 litres (3.5 to 36 cu ft) and are designed for long, trouble-free life with sealed systems guaranteed for five years.

The company has supplied refrigeration units to New Zealand, Syria, Papua New Guinea, Iran and Hong Kong.

WEST GERMANY

Partner for Progress

The 15th Overseas Import Fair 'Partner for Progress' will be held in Berlin from 21st to 25th September 1977. In the previous year, importers, wholesalers, retailers, important department stores and mail-order houses, chain stores and buying co-operatives and trade agents from 85 countries have taken advantage of the fair for establishing of contacts in European market.

The products exhibited include industrial and handmade consumer goods, semi-finished products, food and agricultural products including textiles, clothing, household linen, leather goods, sports goods, jewellery, wooden products and carpets.

In 1976 Fair, 28 firms took part from India. For more details please contact the Indo-German Chamber of Commerce at the following addresses:

Vulcan Insurance Building, Vir Nariman Road, Bombay-400 020 (Tel. No. 291205/291562)

30 A/B, Jawaharlal Nehru Rd., Calcutta-700 001 (Tel. No. 243274)

86, FG Himalaya House, 23, Kasturba Gandhi Marg, New Delhi-110 001 (Tel. No. 44151/40645)

'Maithri', 19, Cathedral Road, Madras-600 086 (Tel. No. 85627)

C-3 Unity Building, Bangalore-560 002 (Tel. No. 26341)

IKOFA—78

The 12th International Trade Fair of the Food Industry will be held in Munich from 15-20 September 1978. There will be seminars, special shows and presentation during the Fair. This will afford an opportunity for discussions, new ideas and new contacts.

Separate sections at the Fair will be available for foodstuffs and high class

provisions for consumers, trade and industry, communal catering, non-domestic consumption; non-food products; technical exhibits for trade, gastronomy, canteens, commercial enterprises and collective shows and joint participation.

The Fair grounds cover 3.3 million sq. meters. For more information:

Munchener Messe-und Ausstellungsgesellschaft mbh, Fair Grounds, P.O.B. 121009, D-8000 Munchen 12, Fed. Rep. of Germany, Phone: (089) 51 07-1, Telex: 5 212 086 ameg d, Cables: AMEG Munchen.

SWITZERLAND

International Tea Promotion Association

The Tea producing countries have decided to establish International Tea Promotion session according to an announcement by the Director of International Trade Centre, Geneva.

The Intergovernmental Conference of Tea Producing Countries which met in Geneva, 7-17 September 1976, prepared the text of the Agreement. The Conference was convened by the International Trade Centre UNCTAD/GATT in accordance with the recommendations of the April 1976 session of the Sub-Group of Exporters of the Food and Agriculture Organization (FAO) Intergovernmental Group on Tea. The participants were from Argentina, Bangladesh, Brazil, Burundi, India, Indonesia, Malawi, Mauritius, Mozambique, Rwanda, Sri Lanka, United Republic of Tanzania, Turkey and Zaire. The FAO and the Commonwealth Secretariat collaborated with the ITC/UNCTAD/GATT in the servicing of the Conference.

The main objective of the Agreement is to establish an International Tea Promotion Association of tea producing and net exporting countries to enable these countries to foster the development and intensification of the co-ordination of their policies and actions on a global basis, for expanding the demand for, and consumption of teas.

The Association shall function through its Governing Board consisting of all the members of the Association, its Executive Director and its staff. The highest authority of Association shall be the Governing Board which shall consist of all members.

THAILAND

ESCAP Annual Session

The thirty-third session of the Economic and Social Council for Asia and the Pacific (ESCAP) opened in Bangkok on 20th April. 31 members and associate members attended inaugural session. Prime Minister Thanin Kriaivixien of Thailand said there was an urgent need to increase co-operation between developing countries and to step up the fight against mass poverty. The Secretary General of United Nations, Kurt Waldheim, referred to the problem of mass poverty and the need for redoubled co-operative efforts with deep understanding and realism.

Harka Bahadur Gurung, Nepal's State Minister for Education, Tourism, Industry and Commerce, was elected Chairman of the session.

1975-76 biennial Economic review was released.

ROME

World Food Programme Aid

The Director-General of the Food and Agriculture Organization (FAO), Mr Edouard Saouma, has approved a World Food Programme (WFP) grant of $ 1,172,000 in emergency food aid for drought victims in the Indian State of Orissa.

A late monsoon in Orissa followed by erratic rainfall last year destroyed the sum-

mer rice crop, reduced by one-half the autumn crop and severely damaged the winter paddy.

Mr Saouma authorized WFP shipments of 6,500 tons of wheat to help meet the needs of the affected people.

HOLLAND

Naarden International and Shell Internationale

Naarden International and Shell Internationale Chemie Maatschappij B.V. are negotiating to set up a joint venture which would draw upon both companies' expertise in the field of Aroma Chemicals. The independence of Naarden International as well as its aroma chemical plants in the Netherlands and abroad remains wholly unimpaired.

Aroma chemicals are materials used for making fragrance and flavour compositions, in which area Naarden International ranks No. 2 in the world. The Shell/Naarden joint venture implies an intention to also attain a leading position in aroma chemicals.

As a first step, a series of products based partly on petrochemicals and partly on terpene chemicals will be manufactured, with an annual sales target of Dfl. 50 million.

At the general meeting of shareholders, Mr H.W.A. van den Wall Bake relinquished his position of Chairman and delegate member of the Supervisory Board, in which he is succeeded by Mr W.A. van Dorp, who stepped down as President of the Board of Directors.

Mr J. P. Guepin was introduced as his successor in that function.

On his departure Mr W. A. van Dorp was honoured by his appointment to Knight in the Order of the Netherlands Lion for his services to the company as well as for his effort on behalf of many national and international organizations.

With reference to the current year's business, it was stated that the recovery continues and that sales as well as earnings fully come up to expectations.

ETHIOPIA

Trade Development

Ethiopia, with an area of 1,222,000 square kilometres, is a vast plateau, having an average elevation of 6,000 ft. The population of the country is estimated at 25,597,000. Christians and Muslims form most of the population. The national language is Amharic.

Addis Ababa is the capital, situated at an altitude of about 8,500 ft. The other important towns are Asmara, Dire Dawa, Hara and Dessie. Addis Ababa is connected by railway from Djibouti, a distance of about 500 miles (750 km). Djibouti is the most important port of transit for Ethiopia. The other two ports in Ethiopia are on the Red Sea—Massawa and Assab.

Import of food items include Meat and Meat Products, Dairy Products, Cereal and Cereal Products, Fruits and Vegetables, Sugar, Honey, Confectionery, Beverages and the total imports during 1973, 1974 and 1975 are 13.2 million, 24.1 million and 20.8 million Ethiopian Dollars respectively.

Government participation in Foreign Trade is limited to areas which are of significant interest to the economic development of the nation and to the health and welfare of the mass of its inhabitants.

The private sector will have the opportunity to participate in the foreign trade of the country. Control is exercised so that the foreign exchange earnings of the country will not be under or over invoiced. Encouragement is given to activities which will enhance the foreign exchange earning capacity of the country.

Foreign capital is allowed to participate in joint ventures only in collaboration with the State.

Commodities imported to Ethiopia include food, beverages and tobacco, textiles and related products, machinery and pharmaceutical products, chemical products, building materials.

UNIDO

Industrial Training Programme

The United Nations Industrial Development Organization (UNIDO) has published their annual bulletin detailing the training opportunities during 1977. This is done with the view to improve the skills and broaden the experience of high-level technical, managerial and administrative personnel. UNIDO does not offer vocational training or formal education leading to a degree. The emphasis is on practical training, upgrading or updating of professional skills, transfer of technological and managerial know-how, co-operation among developing countries in industrial training and assistance to the least developed among the developing countries. UNIDO also undertakes training projects at the request of Governments with a view to meet the special needs and circumstances. Fellowships are awarded after the training; since 1968, fellowships have been awarded to 4650 individuals.

Difficulties are encountered in placement facilities for individual fellows and also the living cost in most of the host countries have been on the increase. Therefore wherever feasible small special group training programme in the same field of training with a common training language are conducted with the support of industrialised countries UNIDO is trying to place more and more fellows in suitable industrial training facilities in advanced developed countries. UNIDO will take over from the United Nations office in Geneva for placing responsible fellows in European host countries.

Nominations for fellowships can be made only by Governments through the UNDP resident representatives in official UNIDO fellowship nomination forms that can be obtained from the offices of the UNDP resident representatives. A total of $ 309,000 is earmarked for fellowships within the 1977 UNIDO regular programme of technical assistance (ID/B/167, para. 6). The amount is allocated to the geographical regions as follows:

Region	*Cost (thousand dollars)*
Africa	90
The Americas	82
Asia and the Pacific	82
Europe and the Middle East	55
Total	309

Fellowships financed from UNDP country programme funds will normally be organized by UNIDO in the form of individual training. Most fellowships financed under the UNDP country programmes and executed by UNIDO are project oriented; such training activities form a component of a technical assistance project comprising also other components such as expert services or equipment.

UNIDO assists the Governments both in drafting projects for industrial training abroad and in carrying them out. Fellowships financed from the Special Industrial Services (SIS) fund will in general be handled in the same way as those financed from UNDP country programme funds.

UNIDO organizes fellowship training at the request of Governments of developing countries willing to bear the full cost plus overheads by establishing funds-in-trust with UNIDO earmarked for this purpose.

For fellowships financed from funds-in-trust, the United Nations financial and administrative rules established for this purpose will apply.

UNIDO organizes study tours for both individuals and groups for high-ranking government officials responsible for industrial development, top managerial staff from certain industrial sectors and experts from UNIDO-sponsored projects, seminars or workshops.

UNIDO organizes in-plant group training programmes for engineers and advanced technical and managerial personnel from developing countries in co-operation with the Governments of host countries.

The objective of these programmes is to provide the participants with concentrated practical experience in their fields of training and an opportunity to upgrade and update their theoretical knowledge in a relatively short time. Invitations to nominate candidates are sent out to the appropriate government authorities of selected developing countries through the UNDP resident representatives.

The table shows the UNIDO in-plant group-training programme schedules to be carried out in the biennium 1977-1978 interesting to our industry.

For further information on assistance UNIDO provides in training, communication may be addressed to :

Training Section, Industrial Operations Division, United Nations Industrial Development Organization (UNIDO), P. O. Box 707, A-1011 Vienna, Austria.

Industrial Redeployment

The General Assembly of the United Nations at its thirty-first session adopted resolutions to promote redeployment of industries from developed to developing countries.

The resolution authorizes the Executive Director of UNIDO to prepare studies and recommend interrelated policy taking into account:

1. Environmental and labour-market conditions, including financial and trade measures for promoting redeployment; the economic structures and economic, social and security objectives of the developed countries; and the principle of permanent sovereignty of States over their natural resources;

2. The identification of specific industries and industrial sectors that would be amenable to accelerated redeployment to developing countries.

The resolution requests that the results of the studies be submitted to the Industrial Development Board (IDB). The assembly adopted resolution relating to the third general conference of UNIDO to be

Date	*Subject*	*Host country*	*Language*
February-March	Quality improvement of industrial products	Japan	E
March-May	Food processing	India	E
March-May	Maintenance management	Sweden	E
April-June	Industrial information	U.S.S.R.	E
July-September	Industrial co-operatives	Poland	F/E
July-September	Quality control	Sweden	E

convened in 1979 and to the establishment of United Nations Industrial Development Fund to be finalised by voluntary contribution. The fund is intended to increase the resources of UNIDO and to enhance the Organization's ability to meet the needs of the developing countries in the implementation of the declaration.

1. In the implementation of the Declaration and Programme of Action on the Establishment of a New International Economic Order adopted by the General Assembly at its sixth special session;
2. To implement the recommendations of the *Ad Hoc* Committee on a Long-range Strategy for UNIDO;
3. To implement field projects, in particular those of an untraditional nature;
4. To intensify its activities in the development and transfer of technology;
5. To intensify its programmes aimed at establishing and/or intensifying co-operation among developing countries and between developed and developing countries;
6. To strengthen its promotional activities;
7. To strengthen its industrial information systems; and
8. To take concerted action and special measures to assist the least developed countries.

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Government Notifications

- *Import of Permissible Spare Parts*
- *Imports Through Airlines*
- *Submission of Proof of Export*

Import of Permissible Spare Parts

Attention is invited to the Import Trade Control Order No. 10/77 dated the 30th April 1977, in terms of which Import Trade Control Order No. 21/76 dated the 22nd November 1976, allowing import of permissible spare parts meant for maintenance of imported machinery or imported parts of indigenous machinery by actual users engaged in industrial production under OGL No. CIV has been rescinded.

It is clarified that import of permissible spare parts covered by the aforesaid Import Trade Control Order No. 21/76 dated the 22nd November 1976, for which firm commitments by opening irrevocable letters of credit were made on or before 30th April 1977, will be allowed clearance by the custom authorities to the extent of letters of credit opened, under the provision of OGL CIV, even if shipment of the goods is made after 30th April 1977. The actual users concerned shall furnish necessary declaration as provided in sub-para I (ii) of the aforesaid ITC Order No. 21/76 dated the 22nd November 1976, and documentary evidence to the satisfaction of the custom authorities that firms commitments by opening letters of credit for import of permissible spare parts were made on or before 30th April 1977, under the provision of the Open General Licence CIV dated 22.11.1976.

Public Notice No. 24-ITC (PN)/77, Dated the 13th May 1977.

Imports Through Airlines

Attention is invited to the Ministry of Commerce Public Notice No. 33-1TC(PN)/76 dated the 30th April 1976 regarding the facility given for imports through Air India/Indian Airlines against REP licences and Actual Users Licences issued for import of raw materials/components/spares and import licences for capital goods/HEP, issued against free foreign exchange (General Currency Area) only.

It has been decided that the aforesaid facilities for imports through Air India/Indian Airlines as per the terms and conditions contained in the Ministry of Commerce Public Notices, No. 61-ITC (PN)/75 dated the 4th July 1975 and No. 92-ITC (PN)/75 dated the 11th September 1975, will continue to be available upto 31st March 1978.

Public Notice No. 25-ITC (PN)/77, Dated the 17th May 1977.

Submission of Proof of Export

Attention of the trade is invited to the Collectorate endorsement F.No. V-(41) 30-11/T/77 dated the 18th May 1977, under which a copy of Government of India's Notification No. 57/77-CE dated 16th April 1977, was sent for information and guidance of the trade.

The effect of the notification is that the goods cleared under rule 191-A should be exported within six months instead of four months and the proof of export thereof should be lodged within three months instead of two months after the goods are exported with the proper officer.

The associations concerned are requested to bring the contents of the trade notice to the notice of their member manufacturers and others concerned.

Notification No. 84 (MP)/GENERAL/(21)/1977, Dated 13th June 77.

Men and Companies

- *Shri Hidayath Ali Mirza*
- *Dr Howard E. Bauman*
- *Dr Bernard S. Schweigert*
- *Dr Richard L. Hall*
- *Prof. R. M. Pangborn*
- *IFT Industrial Achievement Award*
- *Dr A. G. Mathew*
- *Kaveri Food Products*

Shri Hidayath Ali Mirza

Shri Hidayath Ali Mirza joined United Breweries group of organisation. Born on 19th May 1943, he has done B.Sc. and later Masters degree in Business Administration from Indian Institute of Management, Calcutta.

He joined Parle Export in 1968 as Manager marketing and was instrumental in setting up of bottling plants in many states and launching of Limca. He was the chief executive of Bhutan Fruit Products, Samchi, a Fruit and Vegetable Processing Unit. He has recently taken over as Chief Marketing Executive (Eastern India) in the group's non-Alcoholic Beverage manufacturing Unit in Bihar.

Dr Howard E. Bauman

Dr Howard E. Bauman, vice-president of science and technology with the Pillsbury Company, becomes the 38th president of the Institute of Food Technologists, a 16,000-member professional scientific society.

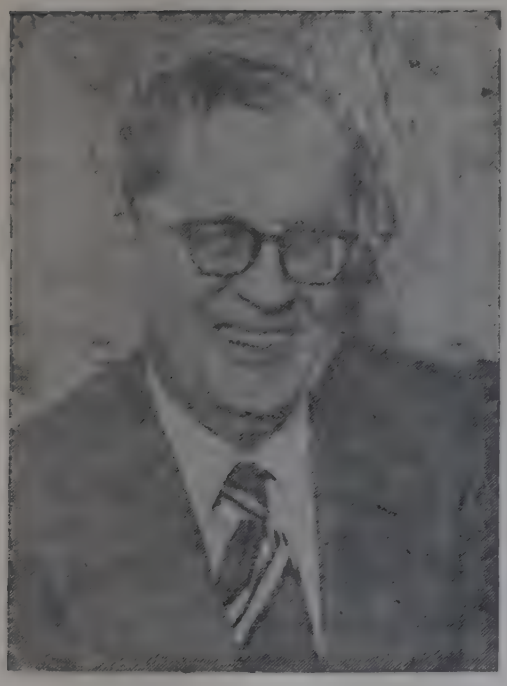
Dr Bauman is a native of Woodworth, Wisconsin. He received his undergraduate and graduate education in microbiology at the University of Wisconsin, receiving the Ph.D. degree in 1953. He then joined the Pillsbury Company in Minneapolis as head of the bacteriology section of their research and development lab. He has been promoted within the company's research and development department, and was named to his present post in 1969.

Dr Bauman has held a number of IFT committee posts and chairmanships, and is a member of numerous professional societies and trade associations. He is a fellow of the IFT, of the American Association for the Advancement of Science, and of the Royal Society of Health (England), as well as a member of Phi Tau Sigma and Sigma Xi honorary societies.

He has developed two patented processes, and is the author of 14 publications.

Dr Bernard S. Schweigert

Dr Bernard S. Schweigert, Chairman of the Department of Food Science at the University of California-Davis, has been elected president-elect, Institute of Food Technologists, U.S.A.



Dr Schweigert, who will become president of the society in July 1978, received his B.S., M.S. and Ph.D. degrees in biochemistry and physiology from the University of Wisconsin. He joined the faculty at Texas A and M University for a two-year stint as associate professor of biochemistry and nutrition after he received doctorate in 1946.

In 1948, he joined the American Meat Institute Foundation, Chicago, as chief of the Division of Biochemistry and Nutrition. He later became associate director and then director of research and education for the Foundation. In 1960, he was named professor and chairman of Department of Food Science, Michigan State University and remained there until 1970, when he accepted his present post in California.

Dr Schweigert has long been active in IFT affairs, holding a variety of posts and committee assignments. He is also a member of many other professional societies, and has published widely.

Dr Richard L. Hall

Dr Richard L. Hall, vice-president, science and technology, McCormick and Company, Hunt Valley, M.D., has been named the recipient of the 1977 Nicholas Appert award by the Institute of Food Technologists at their 27th annual meeting here.

The award is presented annually 'To honour a person for pre-eminence in and contributions to the field of food technology'. It consists of a $ 1000 honorarium and a bronze medal furnished by the Chicago Section of IFT.

Dr Hall received his B.S., M.S. and Ph.D. degrees from Harvard University in 1943, 1948, and 1951 respectively. He joined McCormick and Company as a research chemist immediately upon receiving his doctorate, and was promoted through a number of positions in McCormick's research and development function to his present position in 1975. His work during this period was in flavour research particularly in developing methods of flavour determination, and on the effect of flavour of food acceptance.

In addition, Dr Hall has been deeply involved in a wide variety of policy making and advisory groups. These include governmental bodies, both state and national levels, national professional societies, trade and educational associations. He was vice-chairman of the Panel on Food Quality of the White House conference on Food, Nutrition and Health in 1969; a member of the panel on chemicals and health of the President's Science Advisory Committee, member of the current GRAS panel of the National Academy of Sciences—National Research Council, and Chairman of the Food Services Task Force for the Maryland State Department of Education.

He has been president of IFT (1971-72), and of the Flavour and Extract Manufacturers' Association (1970-71). He now serves as one of IFT's delegates to the International Union of Food Science and Technology, and on the executive committee of the Union. He is a member of

the Food and Nutrition Advisory Council of the Nutrition Foundation, and a fellow of IFT.

He has been active in organizing many major technical meetings, chairing the Third International Congress of Food Science and Technology held in August 1970, and the Gordon Research Conference on Food and Nutrition in August 1974.

Dr Hall is the author of more than forty articles and papers in the field of food technology, and speaks regularly at technical conferences and before lay audiences. Additional evidence of his concern for increased public awareness of food-related issues is the fact that during his tenure as IFT president, the society organized its Public Information Programme, devoted to a broad discussion of complex, often-misunderstood issues involving food safety and nutrition.

Prof. R. M. Pangborn

Prof. Rose Marie Pangborn of the Department of Food Science and Technology, University of California-Davis, was presented with the 1977 Wm. V. Cruess award by the Institute of Food Technologists at its 37th annual meeting on June 5, 1977.

The award honours a person who has achieved excellence in teaching food science and technology. It consists of a medal and a $ 1000 honorarium donated by the Northern California Section of IFT.

Prof. Pangborn received her B.S. degree in 1953 from New Mexico State University and M.S. degree from Iowa State University in 1955. At that time she joined the University of California, Davis Campus, as a junior specialist in sensory analysis, and was appointed a full professor in 1972. From 1973-1975 she served as Associate Dean of the College of Agricultural and Environmental Sciences.

Prof. Pangborn's main area of research has been devoted to the sensory properties of foods, specifically in the areas of the sense of taste and smell, sensory interaction, oral perception and salivary secretion. She has taught courses in sensory food evaluation and cultural food patterns, and it is for this activity that the IFT is honouring her.

In addition to her work with undergraduates at Davis, Prof. Pangborn has travelled extensively in the U.S. and abroad conducting short courses and workshops in sensory analysis. She is co-author of the widely used textbook, 'Principles of Sensory Evaluation', and has published over 110 technical articles.

Prof. Pangborn has been the recipient of many honours. In 1970, she was awarded a Fulbright-Hays Grant to spend as visiting professor at the Swedish Institute for Food Preservation Research in Gothenberg. Both her alma maters have honoured her with Distinguished Alumna Awards—Iowa State University in 1971 and New Mexico State University in 1973.

In 1974, the Chicago section of IFT selected Prof. Pangborn as the F.W. Tanner lecturer. A citation for distinguished teaching was conferred on her in 1976 by the Academic Senate of Davis Division of the University of California.

IFT Industrial Achievement Award

Mississippi State University and Dacus Packaging Corporation have been jointly awarded the 1977 Industrial Achievement Award by the Institute of Food Technologists for their development and manufacture of a new and novel canned catfish food product.

The purpose of the IFT award is to 'Recognize and honour an outstanding food process or application which represents a significant advance in the application of food technology to food production, which

has been successfully applied in actual commercial operation'. The award is in the form of a bronze plaque.

Dr Gale R. Ammerman, professor of food technology at Mississippi State, and Dr Frank McDonald, director of research and product development of Dacus Packaging, collaborated in developing the various aspects of the new food product. Aware of the fact that some 70,000 acres of fish ponds in the U.S. were devoted to raising channel catfish, Drs Ammerman and McDonald set about to find a way to utilize those fish which were either too small or too large to enter the fresh or frozen market.

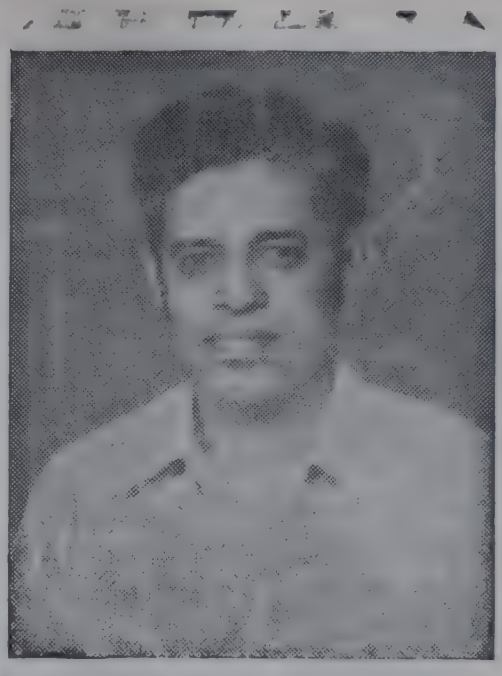
Before a successful canned product could be developed, mechanisms for chemical skinning had to be developed, studies performed on the need to remove bones, and canning processes had to be determined. Initial efforts involved removing the bones, but the texture of the flesh suffered. Later studies revealed that canning the fish with the bones intact, as with salmon and tuna, yielded a firmer flesh and better appearance, and no adverse consumer reactions.

If the consumer acceptance proves high, the sale of channel catfish will help make up for the eventual shortage of canned tuna and salmon in the U.S., while providing a profitable outlet for the 44 million pounds of catfish now being grown in ponds.

Since the flesh is white, of higher protein content than most other canned fish and noticeably lower in price, it should provide a useful food product for family menus. It can be used in much the same way as canned salmon or tuna, in croquettes, patties, salads, and gumbos, for example.

The new product has been sold commercially in the mid-south and Texas markets under the brand Great Catch Catfish, by Dacus Packaging Corp. of Tupelo, Mississippi. Mr William Everitt is president and general manager of Dacus.

Dr A. G. Mathew



Dr A. G. Mathew has been working as Scientist-in-Charge of the CFTRI Unit of the CSIR Complex, Trivandrum, since May 1976. This Unit is set up to concentrate on the post-harvest technological research needs in the commodities like spices, coconut, cashewnut and tapioca. Earlier, Dr Mathew was associated with Central Food Technological Research Institute, Mysore, for 17 years working on the technology of plantation products.

He was a member of the successful project concerning the development of process know-how for the production of spice oleoresin. He is a recipient of the Indian Merchants' Chamber Award for the year 1974 for the same. He was also the Hon. Executive Secretary of the Association of Food Scientists and Technologists (India) during 1973-74 and was the Chief Convener of the Symposium on Spice Industry in India held in early 1974 at CFTRI, Mysore.

Dr Mathew has over 40 publications to his credit including a chapter in Advances in Food Research 1971 on 'Food Browning as a Polyphenol Reaction'. He is a popular writer having contributed to Illustrated Weekly of India, Caravan and Deccan Herald.

Kaveri Food Products

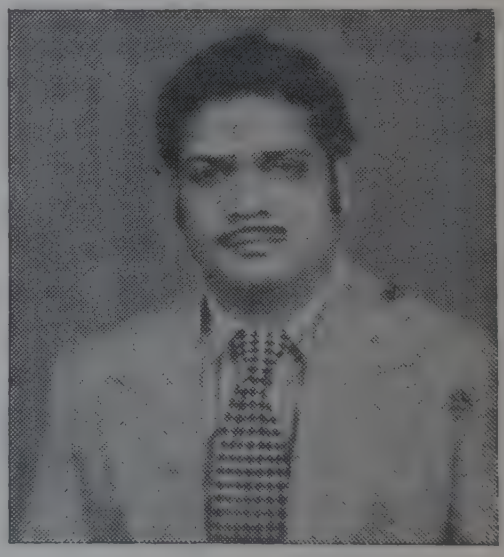
There was a time in the not so distant past when housewives had the time and leisure to make seasonal pickles and store them in huge earthen jars for consumption throughout the year. Rapid urbanisation and changed pattern of living have made pickle—that indispensable part of the Indian menu—a packaged, branded, mass produced item that is sold off the shop shelves. The making of pickles is now generally left to village homes or factories.

Kaveri Food Products (India) Pvt. Ltd. started out with the manufacture of pickles some six years ago. These were essentially based on the famous Kerala pickle recipes handed down for generations. These recipes were modified to suit universal tastes but the purity of ingredients and hygienic methods of preparations were continued as a tradition.

Started as a small scale project at the congested Kalasipalayam in the heart of Bangalore city in a small shed, the Factory was shifted to a more spacious building of their own early in 1974, at Vadarpalayam near Bangalore, Kaveri Food Products (India) Pvt. Limited have gone from strength to strength. It is a telling comment on the quality of the product that it has succeeded in markets as diverse as Calcutta and Madras, Nepal and Trivandrum. Kaveri Pickles were marketed in competitive consumer markets on an all India basis in 1975.

With the success of the pickles, Kaveri Food Products (India) Pvt. Limited were encouraged to increase the range of pickles to meet every preference and taste. Even non-vegetarian pickles and foodstuffs are now being made by a sister concern—Taste Food Industry. Today, there are different types of pickles gracing shop shelves everywhere while people agree wholeheartedly with the advertising message: 'that it's difficult to stop eating Kaveri Pickles'. They tend to become a delicious, tongue tickling habit. 'Kaveri' is incidentaly one of the largest advertised pickles in the country; experiments and diversifications continue with new ingredients, new recipes, new methods.

Exports to the Middle East keep Kaveri Food Products busy on its production schedule. Soon Kaveri Pickles will also be available in chain stores in several cities of U.S.A. and Great Britain. Kaveri are exporting a little taste of India—hot and spicy—for the world to discover and relish.



Shri K. P. Damodaran is Managing Director of Kaveri Food Products (India) Pvt. Ltd. and several other concerns. He is a hard boiled businessman blessed with rare foresight and a shrewd business sense. It is this almost instinctive feeling for consumer needs that led him to build the Kaveri Food Products project from its small nucleus and come to a stage as to tackle bigger competitors in the field. That Kaveri is today a household name is almost his personal achievement.

Shri K. N. Shivshankar is the dynamic Marketing Manager with a hundred

promotion ideas. At a young thirty years of age, he has already come a long way up the professional ladder. One of the rising luminaries on the consumer marketing scene, Shri Shivshankar received a thorough grounding in marketing from Bharati Vidya Bhavan, Madras. He started life as a Sales Representative with Chesebrough-Pond's, then moved over to Glaxo Family Products Division, first at a salesman and then as Area Sales Executive and later as Product Executive. Shri Shivshankar joined Kaveri Food Products in October 1975. He has been appointed Director of Marketing with effect from April 1977.

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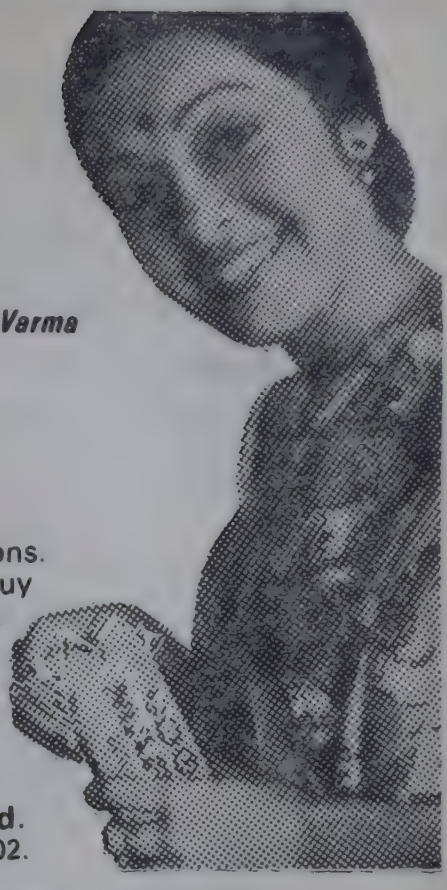

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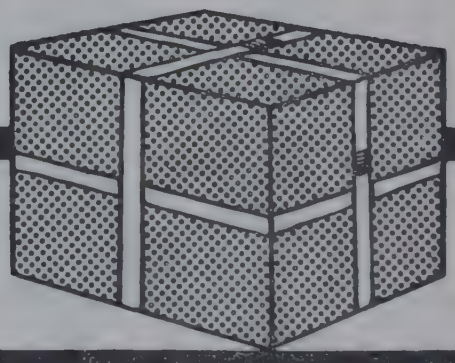

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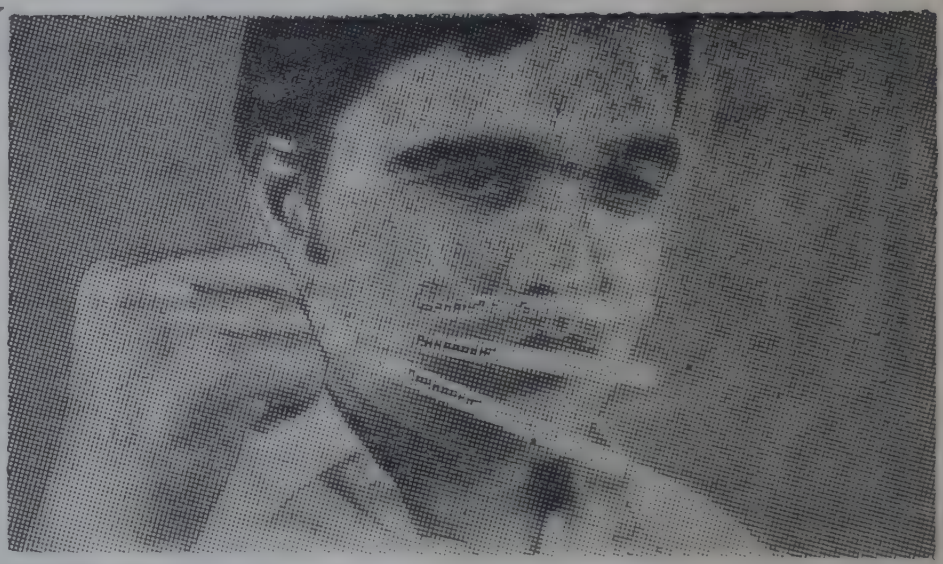

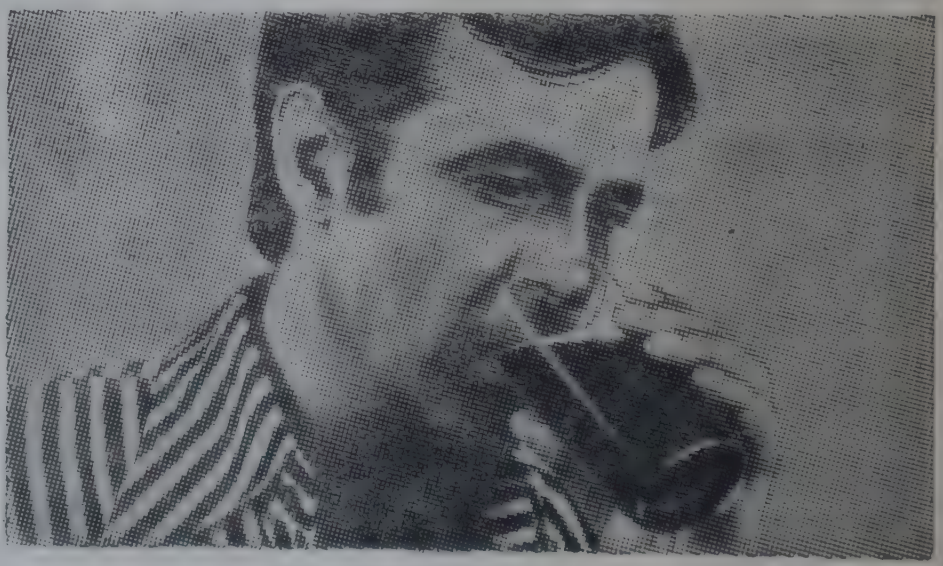

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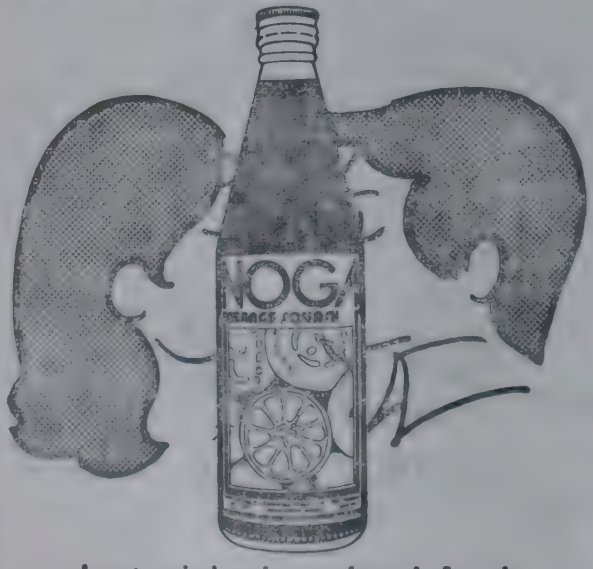

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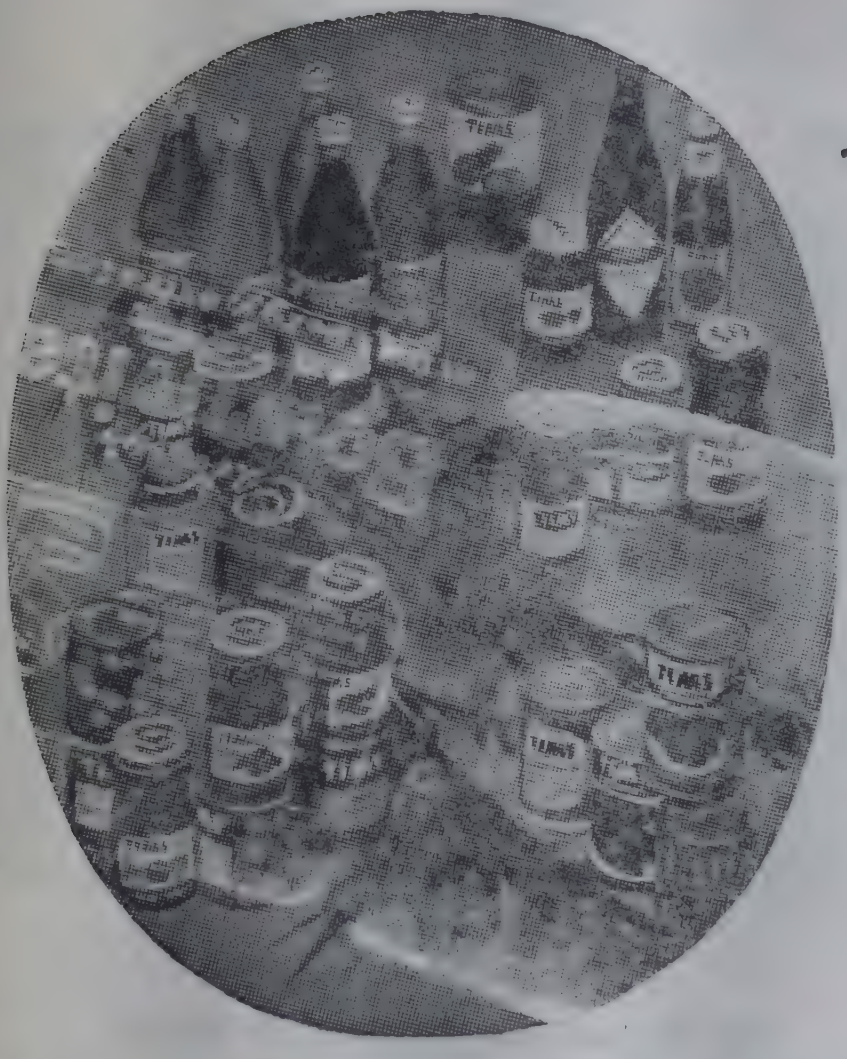

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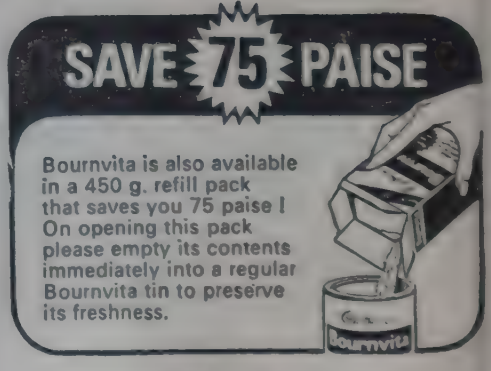
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ALL INDIA FOOD PRESERVERS' ASSOCIATION

take pleasure in announcing

"Raylon Award" 1977-78

for the innovation of a Machine/Equipment
for use by the Fruit and Vegetable Processing
Industry

Amount of Award	...	Rs 10,000.00
Last date of receipt of application	...	31st December 1977
Presentation of Award	...	April/May 1978 At the Annual General Meeting of the All India Food Preservers' Association

Date and Venue will be intimated later

APPLICATION FORM

1. Name and address of the applicant (s)
2. Name of the equipment

2.1 Model No.
Code No.
Purpose/use

2.2 Brief description of the process along with the role played by the equipment
Literature, working pamphlet and photograph of the equipment

2.3 Is it a prototype or working epuipment/machinery

2.4 Improvements carried out after first introduction

2.5 Deficiencies of the equipment and how are they overcome in the new design

2.6 Any additional advantages of the new design

2.7 Working principles and operation

2.8 Power requirements and space requirement

2.9 Ex-works price

2.10 Flexibility and versatility of equipment

2.11 Names and addresses of the fruit and vegetable processing units who are using the equipment

2.12 How many machines are in use in the country and abroad

2.13 Have you previously applied for an award for this equipment elsewhere. Give details

2.14 Is it a copy of existing Indian or Foreign made Machine/Equipment or an original idea

2.15 Capacity, efficiency and cost compared to original equipment

2.16 Advantages of the equipment in reducing processing cost.

2.17 National importance of the machine
Import substitution

2.18 Export potential

2.19 Estimated number of machines required to meet national needs

2.20 Any other plus point justifying claim for the award

Please forward the application form completed with full details and enclosures along with registration fee of Rs 10 per each entry to :

V. B. OBEROI
(Convener)

"RAYLON AWARD" Sub-Committee
ALL INDIA FOOD PRESERVERS' ASSOCIATION
C/o Kissan Products Limited
Old Madras Road
Bangalore-560 016

The information will be kept in confidence.
The deliberation of the judging committee will be held in camera.
The decision of the judging committee will be final.

ALL INDIA FOOD PRESERVERS' ASSOCIATION

ANNOUNCE THE FOLLOWING AWARDS for 1977

Vol. XXXI, INDIAN FOOD PACKER

K. U. Patel *Memorial* Award (Rs. 1,000) donated by All India Food Preservers' Association for the Best Paper.

N. N. Mohan *Memorial* Award (Rs. 1,000) donated by House of Mohmeak's for the best Research Paper.

Yezdi Award (Rs. 1,000) donated by F. K. Irani, Chairman and Managing Director, Yezdi Distilleries, Mysore, for the paper which has a bearing on the research and development of new products.

Here's who.

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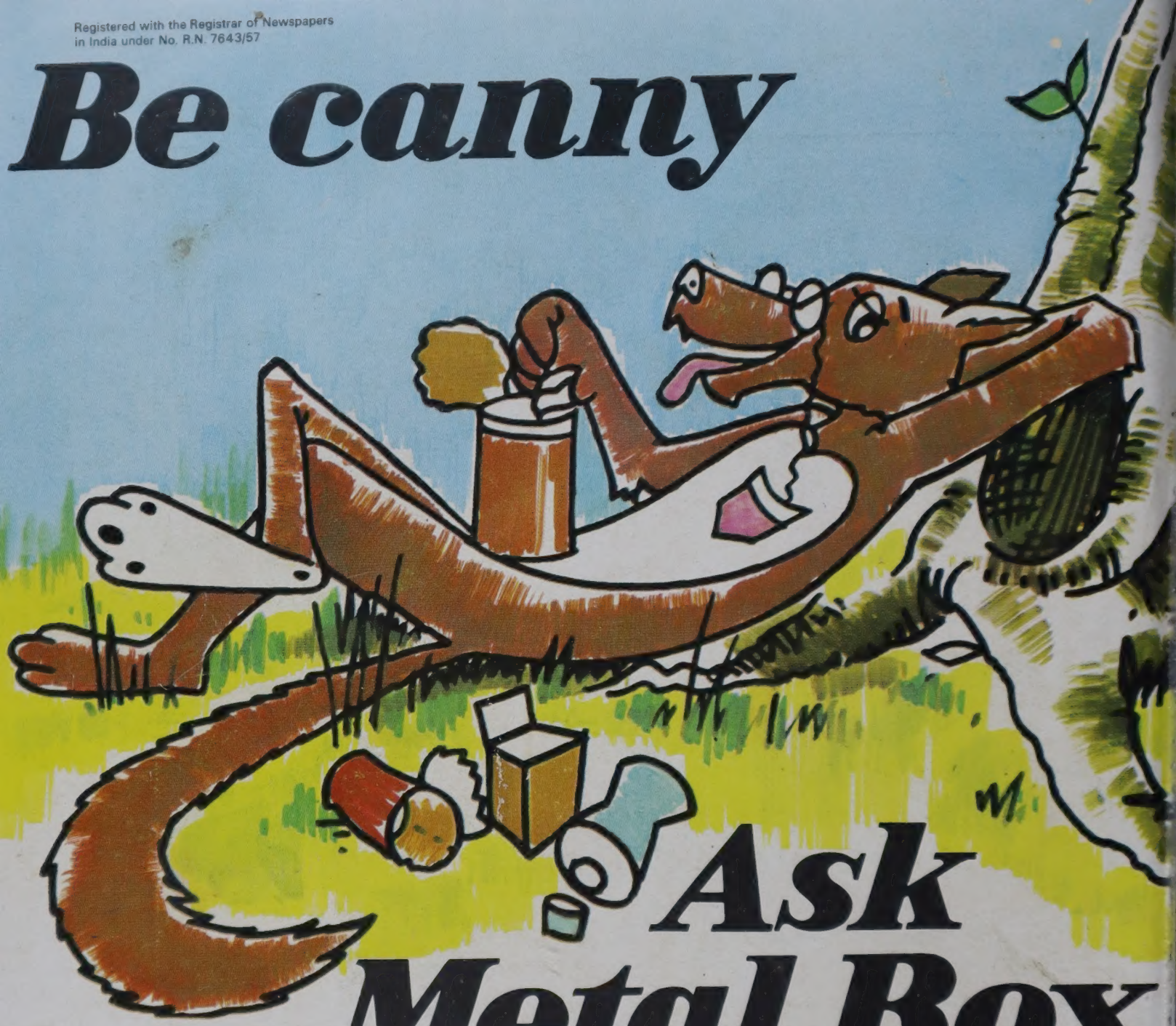

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